SINCLAIR QL WORLD

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Extension Keyboard Kit
One man's experience with Dennis's Keyboard

Biorhythums
Plot your inner rhythums

Linear Regression
Doing things with statistics

DIGITAL PRECISION

THE POWER BEHIND THE BUTTON

1984-1994

THE BEST SOFTWARE FOR THE BEST COMPUTER

A PRIDE IN ITS LOGIC

NO IDEALISTIC PRIG

SPIRITED LOGICIAN

DIGITAL PRECISION

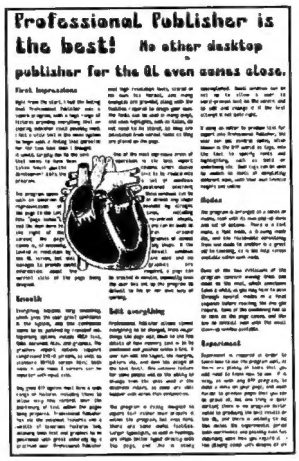
A LOGIC IN ITS PRIDE

PERFECTION SPECIAL EDITION

POWER

PERFECTION SPECIAL EDITION has 253 (two hundred and fifty three) direct/menu commands (not counting options in sub-menus), plus 32 special characters (like Bold on) that can be inserted 'directly' plus intelligent (and now excellently documented) macros. Comparisons with other word processors on the subject of power are hence quite unnecessary.

EASE OF USE


Professional Publisher is the best! No other desktop publisher for the QL even comes close.

Independent reports, customer feedback and published reviews (of its less able but still excellent predecessor, PERFECTION) leave one in no doubt as to which word processor is friendliest – PERFECTION SPECIAL EDITION, with its intuitive, silky handling. Uniquely, it has two operating modes, with both menus (visible or invisible – they even look like Quill's) and direct commands (for when you familiarise yourself with the system). Uniquely, both modes are 're-entrant' (so you can use any menu option or direct command while you are in the middle of performing another option or command – block handling, etc, becomes a dream). Uniquely, PERFECTION SE has fully automatic memory management, grabbing and releasing RAM instantly as your document grows or shrinks – programs without this don't take full advantage of the multi-tasking abilities of the QL! Uniquely, PERFECTION SE leaves you in the driving seat, not juggling things around 'underfoot' while you are typing. Uniquely, PERFECTION SE allows up to nine different documents to be handled simultaneously from one copy of the program – each with totally independent margin, tab, justification, control panel, etc, settings. Uniquely, each document can itself have up to six environment settings, each settable or recallable instantly with a single keypress combination. Each document can have any number (up to 500,000 on GOLD CARD) of candidate blocks! Each document can have two independent windows (of any depth, of any (but same) width across) 'on to' it, even with overlapping text – that allows you to edit in one place while viewing another, to compare 'before editing' with 'after editing' (you can arrange to have one window remain 'frozen' in time), etc. Uniquely, we realise how much faster it is to type in something like CTRL/SHIFT/F5 than (say) F3 F3 R – both involve three keys, but as the former doesn't require the keys to be pressed in just one specific order, or to be released in any order at all (together will do), it is in practice twice as fast as the latter, where no key may be pressed until its predecessor is released. PERFECTION SE takes advantage of all this – it is the little things that count! Uniquely, by providing eight user-definable strips, PERFECTION SE allows you to cope with printers of the future, not just the printers that now exist – you can attach the strips to any printer features. Uniquely, PERFECTION SE's status lines give full information on all relevant global settings. And the manual has an index. Also, it has all the important bits at the front.

WYSIWYG?

By the latest definition of this term, neither is PERFECTION SE fully WYSIWYG, nor are other QL word processors. WYSIWYG means what you see on screen is exactly what you get on paper. Exactly – down to every wiggle in every character in every font.

To get true WYSIWYG, use PERFECTION SE's fully automatic link (supplied as part of PERFECTION SE) to PROFESSIONAL PUBLISHER, where you will get 100% WYSIWYG. 100%? Yes, 100%. With this combination, adjust the horizontal and vertical magnification on your monitor (ie calibrate it once and for all so screen circles correspond to same-diameter printed circles – poor monitors may distort a little bit at the edges). Now you can place your printed output from PERFECTION via PUBLISHER over your monitor screen, and get a match that is more perfect than is your eyesight. Now that is WYSIWYG.

SUPERB PRINT QUALITY & FLEXIBILITY

Uniquely, using the aforementioned automatic link, you can output PERFECTION SE documents using over a thousand fonts (a huge variety of styles and sizes, supplied on the PUBLISHER and TOOLBOX disks) on virtually any printer – from the humblest Epson RX80, Brother M1009 or Star LC10 (which are all single font machines when used with most word processors) to top-end lasers. ***You are not limited to the fonts built into the printer!!*** All PERFECTION SE **bold**/underlined/ *italics*/^{super}/$_{sub}$, etc, settings are preserved. Proportional spacing and micro-justification are automatic, even when you mix fonts of differing widths *and heights* (even on the same line), vary line spacings, etc. Uniquely, you are not trapped with one type of micro-justification (ie adding all the space between words, and using the predefined widths of characters as their separation) – with our system, you can vary (in 5% steps) the proportion of micro-spaces added between words to that added between characters (the latter in proportion to their *individual* widths). Settings around 65%-35% – not the 100%-0% forced upon you by some other word processors – seem to give the most pleasing results. Uniquely, you are not limited to mere rectangular columns plus headers/footers – that's all the rest can do – you can output in any sequence to any number of frames (text flowing from one to the next), each of any shape – irregular polygons of up to 66 sides, circles, multi-column or part-column boxes (hundreds of types of borders, thousands of textures), doughnuts, wrap-around shapes, even re-entrant ones ('join-the-dots' type borders, even with intersecting edges) – all with micro-justification and proportional spacing! Look at the example on this page. Of course, if super fancy output or special effects are not of the essence, PERFECTION SE's direct printer output is more than capable of meeting your needs.

THE FASTEST

For benchmarking, we've used an unimpeachable file – not one created specially – a public domain version of the first book of The King James Bible, all fifty chapters of the book of Genesis. This came to **one hundred and forty pages**, well over **forty two thousand words** excluding headers and footers, well over **two hundred and twelve thousand characters** excluding justification ones and **one thousand five hundred and thirty three indexed verses**!! We didn't use a smaller file (as used to benchmark other programs) as PERFECTION SE's timings for most operations then become impossible to stopwatch (too fast!). The hardware used for all timings was GOLD CARD: speeds would be **further improved by over three times** using the SUPER GC. Of course, LIGHTNING SE was used. File operations were to ramdisk: normal slave blocks would give identical times. All settings on **everything** were for maximum speed, except where indicated to the contrary – we have the sense **not** to force full speed upon you in operations like scrolling and global Search & Replace. PERFECTION SE's speed for these is switchable (at run-time and when configuring), as too great a speed may cause overshoot (with scrolling) or fatal alteration (if there is human error inputting the target or replace strings). Here are the benchmarks for this huge file:

Load 140 pages: 0.6 seconds (yes 0.6, not 6!) ☆ Import 140 pages: 0.6 seconds (yes 0.6, not 6!) ☆ Save 140 pages: 0.5 seconds (yes 0.5, not 5!) ☆ Export 140 pages: 0.5 seconds (yes 0.5, not 5!) ☆ Case-sensitive search from top for word at bottom: 0.4 seconds (yes 0.4, not 4!) ☆ The same, but case case-insensitive: 0.5 seconds (yes 0.5, not 5!) ☆ Case-sensitive search backwards from bottom for word at top: 0.4 seconds (yes 0.4, not 4!) ☆ The same, but case-insensitive: 0.5 seconds (yes 0.5, not 5!) ☆ Automatic Search & Replace, in Fast (No Query) mode, of last 600 occurrences: 7.4 seconds (same length replace string); 7.7 seconds (shorter replace string); 10.5 seconds (longer replace string – longer time as we deliberately chose a high *density* of replaces to handicap PERFECTION SE into auto-managing memory – without causing any heap fragmentation, but still with only a 0.005 second overhead per replace!). ☆ Automatic Search & Replace in Slow ('Querying') mode: arbitrarily slow, typically 30 times slower – because we deliberately allow for human response time (in case you want to abort) before proceeding from one replace to the next – booby prize to anyone for benchmarking us on this setting!! ☆ Scrolling 100 lines of text, up or down, by full-width screen page: 1.5 seconds ☆ Scrolling 100 lines of text on full-width screen, line by line, in slow (full) mode: 5.7 seconds (down)/5.8 seconds (up) ☆ As above, but in medium speed mode: 4 seconds ☆ The same, but in fast mode and default settings: 13.5 seconds to scroll through the whole massive document, averaging 0.23 seconds per 100 pages (!) – and this could be made up to ten times faster by reconfiguring PERFECTION SE ☆ Reformatting paragraphs, changing margins, justification, etc, of existing text: c5 times faster than predecessor ☆ Inserting (or undoing) emphasised, underlined, italics, superscript, subscript, 8 strips, 6 environment settings: Instant (i.e. immeasurable) ☆ Navigation to line or page or to top or bottom or to 8 markers or to highlights/blocks: Instant ☆ Setting new margins, justification, etc: Instant ☆ Deleting block of 100 pages: 0.3 (yes, 0.3 not 3!) seconds ☆ Copying/moving block of 100 pages (not just 10!), downwards or upwards: 3.4 seconds (yes, including all the time for automatic memory management and anti-fragmentation – other programs are light-years behind) ☆ Spellcheck as you type: Ten times faster than anyone can possibly type ☆ Spellcheck all 140 pages in the document using the 350,000 word Mega Dictionary: 3.9 seconds (20 'errors' – like 'pluckt'!) ☆ And using our tiny dictionary (well, tiny by our standards – large by comparison with most others): 5.1 seconds (566 'errors') ☆ Time taken to create user dictionary from the results of the second spellcheck (566 errors): 0.8 seconds to extract all 'errors' from document and clean document; 1.9 seconds to create a full user dictionary therefrom and also a sorted, duplicate-free wordlist file (for browsing) ☆ Spellcheck file (ASCII or native): Even faster. ☆ Print first 10 pages to file: 3.5 seconds. ☆ Change every occurrence of God to ***God*** in bold underlined italics, strip 2 – 9.5 seconds!

TECHNICAL NOTES Reformatting is the amendment of a section of previously-entered text to conform to margin, indentation, justification and pagination settings after the user returns to it and makes alterations, either by hand (by over-typing, deleting, adding or otherwise changing) or using search and replace, merge etc. PERFECTION SE lets the user pre-configure, or tune at run-time, the desired reformatting behaviour. The options are to either select Never (most suitable for technical users, and what all previous PERFECTIONs did: you had to initiate the reformat of the re-edited para), Instant (= 0.1 seconds, giving in-situ real-time automatic reformatting as-you-type: common in word processors, and irritating to the eye) or User-delay, the most flexible setting (giving slightly delayed auto-updating of lower text). On User-delay the user is free to set any delay from 0.2 seconds to 99.9 seconds in 0.1 second steps. About 1.5 seconds is best for sedate typists and 0.3 seconds for speed demons. This means that you are not hassled by continuing screen changes on lines below the one you are editing and concentrating upon, or shufflings around on the current line caused by right or centre justification. When you pause in your typing for longer than the set delay, PERFECTION SE automatically tidies up, without you having to do anything. On User-delay, if you navigate or progress off the line, or invoke any menu or command (including Save, Print etc.), an auto-reformat occurs instantly. This means that you are never left with the document in the wrong state. With these options, you have the best of all possible worlds.

Also, SHIFT/CAPS now obeys the indent margin (which matters if the cursor is on the first line of a para) and leaves the cursor position unaltered within the text. Other reformatting commands are unaltered, so you can still step through paras reformatting manually as you go, if you wish. The maximum number of lines, characters, words, lines, pages etc have all been increased (effectively to infinity: e.g., the new limit on characters is 30 million-million, this up from 2 million, restrictive in Super Gold Card / QXL days!). Also, the new version (starting with v5.13) is even faster, and its handling of complex search/replaces (say, involving end of line codes) has been optimised. PERFECTION SE really is superb!

DIGITAL PRECISION PRICES

	£
3-D PRECISION CAD SYSTEM	49.95 d
ADVENTURE CREATION TOOL SPECIAL EDITION	49.95 r
ARCADIA GAME	9.95 s
ARCHIVE DEVELOPMENT SYS + RUN-TIME MODULE	29.95 a
ARCHIVE TUTORIAL	19.95 a
BETTER BASIC EXPERT SYSTEM	24.95 a
BLOCKLANDS GAME	9.95 s
CASH TRADER v3.3 + ANALYSER	99.95 c
COMPARE FILE UTILITY	19.95 a
COPY UTILITY FOR BACKING UP	9.95 a
CPORT BASIC TO C AUTO-TRANSLATOR WITH C68 COMPILER	99.95 c
CPORT BASIC TO C AUTO-TRANSLATOR	89.95 c
DATABASE ANALYSER FOR ARCHIVE	19.95 a
DAT-APPOINT APPOINTMENT DATABASE SYSTEM	19.95 d
DESKJET/LASERJET DRIVER FOR PRO PUBLISHER	19.95 c
DESKTOP PUBLISHER SPECIAL EDITION	39.95 c
DESKTOP PUBLISHER	24.95 d
DIGITAL C COMPILER	29.95 a
DIGITAL C SPECIAL EDITION	49.95 a
DISKTOOL WITH QUICKDISK	19.95 b
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EDITOR	29.95 a
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FONT ENLARGER	19.95 r
GAMES COMPENDIUM (ALL FIVE GAMES)	29.95 a
GRAFIX 24-PIN UNIVERSAL PRINTER DRIVER	14.95 r
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IDIS INTELLIGENT DISASSEMBLER	24.95 a
IDIS SPECIAL EDITION	39.95 d
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LIGHTNING SPECIAL EDITION ACCELERATOR	49.95 h
LIGHTNING GOLD SPECIAL EDITION	39.95 a
MAILMERGE DATABASE SYSTEM	19.95 a
MEDIA MANAGER SPECIAL EDITION	49.95 d
MEDIA MANAGER	24.95 a
MEGA DICTIONARY	29.95 g
MICROBRIDGE	39.95 d
NAMES AND ADDRESSES DATABASE SYSTEM	19.95 d
PAYROLL SYSTEM	49.95 c
PC CONQUEROR GOLD SPECIAL EDITION WITH DR-DOS v7	179.95 g
PC CONQUEROR GOLD SPECIAL EDITION	99.95 g
PC CONQUEROR WITH DR-DOS v7	139.95 r
PC CONQUEROR	59.95 r
PEDIT PRINTER DRIVER FOR XCHANGE	19.95 a
PERFECTION PLUS SPECIAL EDITION WITH SPELLCHECKER	139.95 c
PERFECTION PLUS WITH SPELLCHECKER	99.95 r
PERFECTION SPECIAL EDITION WORD PROCESSOR v5	99.95 c
PERFECTION SPECIAL EDITION DEMO VERSION + SAMPLE DATA	19.95 c
PERFECTION WORD PROCESSOR v3	59.95 d
PERFECT POINTER TOOLS	29.95 a
PROFESSIONAL ASTROLOGER WITH ASTRONOMER	69.95 a
PROFESSIONAL ASTROLOGER	59.95 a
PROFESSIONAL ASTRONOMER	29.95 s
PROFESSIONAL PUBLISHER TOOLBOXES (BOTH PARTS)	49.95 r
PROFESSIONAL PUBLISHER TOOLBOX PART ONE	29.95 r
PROFESSIONAL PUBLISHER TOOLBOX PART TWO	29.95 r
PROFESSIONAL PUBLISHER	89.95 c
QFLICK CARD INDEX SYSTEM	29.95 a
QKICK FRONT END SYSTEM	24.95 a
QMATHS MATHEMATICAL SYSTEM PART ONE	69.95 c
QMATHS MATHEMATICAL SYSTEM PART TWO	59.95 c
QMATHS MATHEMATICAL SYSTEM (BOTH PARTS)	99.95 c
QMON MACHINE CODE MONITOR	39.95 a
QUICKLASER PUBLISHER DRIVER FOR LASERJET/DESKJET PRINTERS	19.95 c
RECOVER ARCHIVE UTILITY	19.95 a
REVERSI GAME	9.95 s
SEDIT + SCREENPRINT ARCHIVE UTILITIES	19.95 a
SOLUTION PC EMULATOR WITH DR-DOS v7	109.95 r
SOLUTION PC EMULATOR	29.95 r
SPELLCHECKER WITH DICTIONARIES	49.95 d
SUCCESS CP/M EMULATOR	49.95 b
SUPERBASIC MONITOR	24.95 a
SUPERFORTH COMPILER WITH REVERSI	39.95 a
SUPER ASTROLOGER	24.95 s
SUPER BACKGAMMON GAME	9.95 s
SUPER SPRITE GENERATOR	29.95 a
TOOLKIT III WITH ROM	49.95 h
TOOLKIT III	29.95 a
TRANSFER UTILITY SPECIAL EDITION	29.95 b
XREF SUPERBASIC PROGRAM ANALYSER	29.95 a
TRANSFER UTILITY	9.95 b
TURBO BASIC COMPILER + TOOLKIT	79.95 a
ULTRAPRINT SCREEN DUMP UTILITY	19.95 a
XREF SUPERBASIC PROGRAM ANALYSER	29.95 a

KEY a=Available either on cartridge or disk; b=Disk only; c=Minimum 512K exp: disk only; d=Minimum 256K exp: either cartridge or disk; r=Minimum 256K exp: disk only; s=Cartridge only; g=Minimum 1.5Mb RAM: disk only disk; h=ROM + (cartridge or disk)

AND NOW - BEST-EVER SPECIAL DEALS...

5% off 2 programs
10% off 3 programs
20% off 4 programs
30% off 5 programs
40% off 6+ programs!

SUPER GOLD CARD

This amazing product is the way forward for the QL. Like Gold Card before it, the brand-new **Super Gold Card** is a plug-in disk interface and RAM expansion that works on all QL versions. Incredibly, it is *over three times* speedier than Gold Card, with *over twice* the RAM and with many enhancements. It complements LIGHTNING SPECIAL EDITION like nothing else, squeezes the best out of TURBO (which was designed with 32-bit CPUs in mind) and really accelerates PC CONQUEROR. **Super Gold Card** is actually as fast, or slightly faster, than the much vaunted QXL: also, it is **100%** QL-compatible **now**, and no PC is needed. The table below really says it all:

System → / *↓ Features*	*Bare QL*	*TRUMP CARD I*	*GOLD CARD*	**SUPER GOLD CARD**
Relative Speed	1x	1.8x	7x	**25x !**
Motorola CPU	68008	68008	68000	**M68020**
Clock Frequency	7.5MHz	7.5MHz	16MHz	**24MHz**
Bus width	8 bit	8 bit	16 bit	**32 bit**
RAM fitted	128Kb	896Kb	1,920Kb	**3,968Kb**
RAM access speed	Slow	OK	Fast	**Twice as fast**
PCB population	V.high	High	V.low	**V.low**
Physical dimensions	Monolith	Full-size	Half-size	**Half-size**
Lock-up frequency	Ouch!	Occasional	V.rare	**Won't**
Battery Backup Clock	No	No	Yes	**Yes**
Clock Protection level	N/A	N/A	Modest	**High**
Toolkit II + Manual	No	Yes (early vns)	Yes	**Enlarged**
Sub-directory support	No	No	Yes	**Yes**
Parallel/Centronics port	No	No	No	**Yes**
Spooler/Screendump/Ramdisks	No	Yes	Yes	**Yes**
Speedup switch (Screen#2)	No	No	No	**Yes**
Future hi-res graphics	No	No	No	**Planned**
Disk drives supported	N/A	SD/DD	SD/DD/HD/ED	**SD/DD/HD/ED**
Max no: of disk drives	0	2	3	**4**
Max sectors/disk	N/A	1,440	6,400	**6,400**
Max disk transfer rate	N/A	30Kb/sec	120Kb/sec	**>120Kb/sec**
Peripheral card tolerance	OK	No	No	**OK**
SCSI-2 compatibility to-be	No	?	No	**Yes**
Miracle/DP Warranty	No	No	2 years	**2 years**
DIY/Kit incorporability	Yes	No	No	**Yes**
Overall Rating by DP	2%	10%	30%	**110%**

And to the Very Best news: from DP, SUPER GOLD comes SUPER CHEAP!
SUPER GOLD CARD, plus a no-limit extra 20% SOFTWARE DP DISCOUNT VOUCHER, plus a FREE mystery DP program, plus a FREE Dust Cover, will cost you a mere £375 ✓✓✓✓
Less £125 if part-exchanging your standard 2Mb Gold Card
Add £125 for ED 6400-sector Disk Drive (PSU, cased, cables).

OTHER HARDWARE EXCHANGED AND SOLD BY ARRANGEMENT. PLEASE ORDER NOW: WE EXPECT VERY HIGH DEMAND FOR SUPER GOLD CARDS, AND WE DON'T WISH TO DISAPPOINT. INTERNATIONAL RAM PRICES ARE UNSTABLE AND PRICE HIKES MAY BE INEVITABLE. CONSEQUENTLY, THE ABOVE COMBINATION OFFER COULD BE WITHDRAWN WITHOUT NOTICE...

The software discount must be taken at the same time as the main order, and CAN be combined with the SPECIAL DEALS discounts. For example, if you chose six DP programs of total list price £100, you would only have to pay £100 -40% -20% = £48 for them! And, of course, you would also get the two gifts absolutely free, and a 4Mb SUPER GOLD CARD too!

*TERMS & CONDITIONS * We accept payment by VISA, Mastercard, Access, Eurocard, Eurocheque, £ cheque drawn on a UK branch of any bank or building society, postal order, cash, travellers cheques or direct funds transfer to our bank account #60327808 at Barclays Bank plc, South Chingford Branch (sort code 20-53-00), NE London Business Centre, PO Box 2403, London N18 2BY. If you must use another currency, add 7.5%. If you must use another form of cheque, add £15. * Upgrades cost only the difference in current price plus £10; return the original disk and manual. But do NOT return the manual if the upgrade is to a "SPECIAL EDITION" of your original program: you will be sent useful supplementary documentation. Upgrades from LIGHTNING are the exceptions to the last rule! * Only DP programs and upgrades (i.e. not DR-DOS) count towards discounts. * Prices are all-inclusive for UK mail-order. Rest of Europe, add 5%. Elsewhere, add 10% (Air Mail). * We aim for 24 hour turnaround. * DP & Digital Precision are trading names of Digital Precision Ltd, Company No.1833989, registered in England & Wales. * Orders using your own paper are also welcome!*

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QL

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Coming Soon

Not quite as much as we would have liked, unfortunately. See **Editor's Notebook on page 9.**

BARGAIN OF THE MONTH.

QL unused with Gold Card & Twin 3 1/2 drives
£200 o.n.o 0993 811181 (Oxon)

QL Scene

Ten New Digits for Digital Precision

Your assistance is craved to give the Vachhas a breather.

Digital Precision have been augmented, however slightly for the present time, by the arrival of a d aughter, **Michelle,** of very small dimensions. Congratulations to Julie and Freddie.

Due to her early arrivel and a minor operation, Michelle is being looked after by Great Ormond Street Hospital in London for the time being. The new arrivel and a recent bereavement in the family are occupying Freddie and Julie's thoughts a good deal at the moment, so Freddie asks if DPs customers would kindly send in any technical or trade queries or any complicated orders in **by letter** for the time being, so that he can handle them more easily. Normal orders will be handled by the answering machine as usual.

For any of Digital Precision's customers who are affected by the holdup on boards for the new batch of Miracle **Super Gold Cards**, the batch is expected towards the end of May and so should be on their way by the time you read this.

Progs List Information

PROGS have issued some new **leaflets** on all their programs. The leaflet designs are based on their excellent graphics package LineDesign.

"LineDesign" say Progs "Is a drawing program, but it can also be used by people why are not good at drawing." They also supply 150 clipart examples.

ProForma Is a vector graphics library for C and Assember programmers, giving high quality output. ProForma is used by LineDesign, PFlist and PFdata to produce the output. ProForma includes clipping paths, transformation matrixes, true WYSIWIG, grey shades, lines and Bezier curves, and other facilities incuding bitmapping for older graphics.

PFlist is an easy-to-use listing generator for any printer, especially inkjet and laser printers. It can include footers with name and date (not for QL World please!), and always allows space for hole-punching for filing. Listings can be in full page, two columns and/or landscape, and the fonts and font size can be chosen from a selection.

There are now some smaller members in the DataDesign - "probably the most userfriedly database program in the world!" to quote Progs again - family.

PFdata creates hardcopy from DataDesign through ProForma, giving a large selection of fonts (including those available in LineDesign and PFlist, for LineDesign users. You see how all PROGS' progs work together). "PFdata is the ideal tool for generating tables", say Progs. Using DataDesign as its source, it can also create labels etc. PFdata also allows you to specify a LineDesign file as a background to the printout, so that output can be mixed with drawings, logos, etc.

The confusingly-named (as others have also remarked) **pfb2pff is a collection of programs** to allow you to convert an Adobe Type 1 -pfb files into a ProForma -pff font file, add kerning information, print out the complete fonts. Bryan has more to say about this in Troubleshooter this month.

News on DataDesign API is that the **C interface has now been adjusted** to make it compliant with C68 V4.10 onwards, with a few minor changes.

Among the other leaflets which Progs have produced is a complete DataDesign Engine versions pedigree to date - interesting for reference. When we say complete, we mean including such comments as:

"v3.07 view still allowed you to scroll one too far (oops)".

For more information and price lists please contact **Progs Professional and Graphical Software, Haachtstraat 92, B-3020 Veltem, Belgium. Tel. 010 32 16 48 8952 (from UK to Belgium)**.

QL 10 Anniversary in Belgium on 18th June!

Miracle Systems are Sponsoring June's QL Tenth Anniversay show , at the Eurovolleycenter, Beneluxlaan, Vilvoorde, **Brussels** in Belgium.

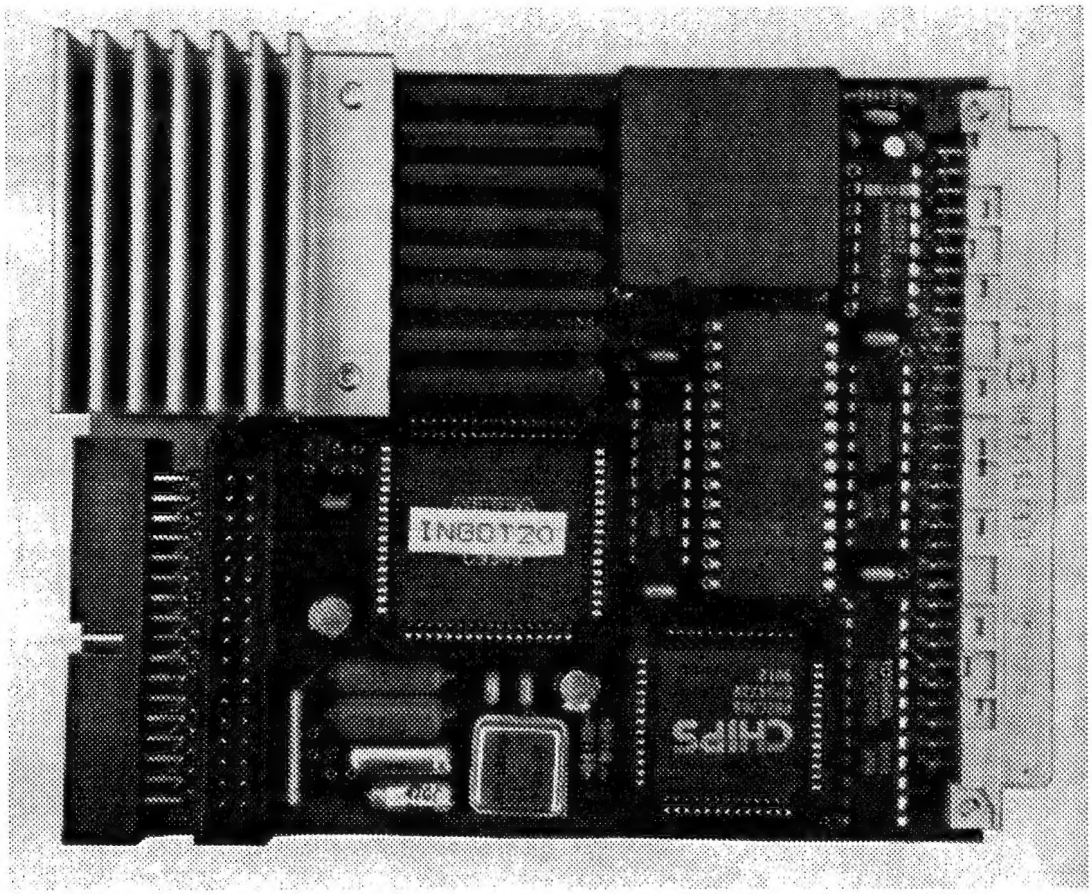
The Belgian show, organised as usual by Jacques Tasset of Club Sinclair BruQsl, is on Saturday 18th June 1994 from 10am to 17pm. For further news contact Jacques, Aarlenstraat 104, B-1040, Brussels. Tel. 010 32 2 233 1222.

Miracle will be showing the **Super Gold Card** (which has been in short supply well into May, as the demand took overyone by surprise, "even Digital Precision" according to Freddie, and the sophisticated four-layer PCB in the Super Gold Card can't be done as a rush job). It's being reported here and there that Gold Card users are often ordering SGCs for their "first machine" and handing on their Gold Cards to their "second machine". Also expected from the English side are other members of the travellers league of QL suppliers - Tony Firshman, Bill Richardson, and Ron Dunnett of Qubbesoft.

Stuart Honeyball of Miracle alone among the English suppliers made it to **Rhode Island** this year - the rest of them went to the **Quanta** workshop in Surrey on the same day! Well, lower overheads. Stuart reports that the **Miracle in Newport** show was smallish, but saw a lot of money changing hands and a jolly good place to socialise. "Everyone saw it as a highly successful show", he says - not bad cnsidering he wasn't able to take Super Gold Cards with him because of the aforementioned shortage at the time.

Next year **IQLR**'s Bob Dyl is hoping to put the Show on in Detroit, which is several hundred miles more centralin the USA than Newport, offering lower overheads to American travellers, who come from all over the States.

MIRACLE SYSTEMS



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OPEN CHANNEL

PC Archive?

I understand that there is a **PC version of Archive** in existence. I would be very grateful if this could be confirmed and if so, where it can be obtained. I know of **ArcPlus**, but cannot afford £250. Hopefully Archive for the PC will be a bit more reasonable priced.

Dave Sanderson
Portland
Dorset

There seems to be a sudden revival of interest in advanced Archive, even before Transform released their latest version of ArcPlus. Psion no longer sell or support PC-Four - I got the impression they were out of stock - , and Transform are the only company they are aware of working with PC Archive.

Psion's address for enquiries in the UK is Customer Services, Psion Plc, Alexander House, 85 Frampton St., London NW8 8NQ. In the field likely to be of interest to QL users now, Psion concentrate almost entirely on their famous Organisers.

Add On Inf

In my last mailing, I asked my customers what sort of add-ons they would like to see for Qdos. The following "hit list" is compiled from over 100 replies (giving about **230 wishes**). I think it should be very interesting to programmers and developers, and I hope to make sure it is published wherever possible:

1. A **word processor** running under the Pointer Environment.
2. **Desktop publishing** under the Pointer Environment, but **integrated**, not as two programs like LineDesign/Text87. Maybe the next job for Progs?

More than one-third of the customers asked for one of the two things above!

3. **Fax software**. It seems that many people have not recognised that Jonathan Hudson has written an excellent Fax software package, called **QFAX**, which is PD and can be obtained from various sources, including my QBox.
4. (Which surprised me most) A **replacement program for Easel**, under the Pointer Environment.
5. An **Archive replacement**. (We have got DataDesign, but this does not seem to be suitable for some of the customers, although I don't know why!)
6. A real **CAD** program. [Electronic or structural, Jochen?]
7. More **colours** (can't be done in software, sorry!).
8. **Pointer communications program** - again, we have a superb PD program which codes everything including ZMODEM. It is called QTPI!
9. **Footnotes in text87** - but not a lot I can do about that!
10. **Fast disk copier** for ALL systems, including Atari and Gold Card.
11. **Backup program**. A very good PD backup program, written by Arvid Børretzen, is called **NorBack** (which can be downloaded from the Qdos Box).
12. **Scanner interface and software**, but NOT a printer's head scanner.

All of the remaining wishes were unique, which again proves that most Qdos users are very individual users. There are all sorts of wishes, ranging from BTX programs (same as Mintel in France), Mac-Emulator, Minix, Disk Doctors, etc. up to specific conversion programs for people who use Qdos and other programs on other systems.

Best regards,

Jochen Merz
Duisberg
Germany

Deskjet Printer

After your remarks about not informing the readership about things that I knew, I have taken your request for information from **satisfied printer users**. So here goes:

Some time ago I had need to produce a quality thesis for my daughter who was at University. From around the end of 1984 I had been using a Brother HR15 and had been very satisfied with it apart from the noise of the daisy wheel and its slow printing rate.

I wanted to produce the thesis in Times Roman using different fount sizes and proportional spacing. This led me into the realms of **Text87 and a HP DeskJet 500 together with the special DeskJet driver from Software87**. With this setup I have no difficulty in printing the ø in Norweigan names without resorting to translation tables and the like.

I purchased a fount cartridge for Times Roman and was then able to print in 8, 10, 12 and 14 point Times Roman with the usual bolds, supers and subs and was all set to go. The result looked very professional and we were all delighted with the presentation.

That was just over three years ago and the DeskJet has continued to work hard for its living. Countless reams of A4 paper have gone through the machine and it has been used to produce a variety of letters, notices etc. **LineDesign** is now used to produce the latest notices and listings.

The DeskJet is a very simple machine to set up and I have created setup files to use it for **Quill, The Editor,** and **Perfection**. I can therefore highly recommend it. I have no reason to believe that the modern day updates to the basic deskjet family would be any different.

I have said my machine had gone through many reams of paper without problem. That was until one day towards the end of last year it spat out a cog! I contacted the Customer Services Department of HP on a Friday and asked for the name of local authorised repairers. I was told that they did their own repairs and was asked for the serial number. A phone call later I was told that the machine has a 3-year warranty and my machine was in warranty. I was even more surprised to be told that they could call at my home and collect the machine for repair. A date was made for the following Monday afternoon. Much to my amazement and delight it was delivered back to me on the Thursday afternoon free of charge. That is what I call Service!

In summary the HP DeskJet is a fantastic machine and I have had exceptional service from HP.

I am please to see that SNG has finished with that blasted mouse driver! In his latest offering he seems to be in part duplicating the tasks done my TaskMaster and Qpac2. Both offer simple handling of files and offer also a means of viewing them. Anyway, here is my cheque for another year. Would you please note the change of address and by the way, what happened to the Troubleshooter in the March issue?

A G Kendall
Felden
Herts

Thank you. The Deskjet is popular and not expensive for what it does. Output quality is high, and AG has reinforced the point about foreign characters by decorating the top of his continuation sheet with a string of Øs!

Troubleshooter was having time off owing to pressure of business. Simon will be sad that you don't like his mouse

Open Channel is where you had the opportunity to voice your opinions in Sinclair QL World. At least, it was until the channel had to close. If you have any parting words, we can still be reached at Open Channel, QL World, The Blue Barn, Tew Lane, Wootton, Woodstock OX7 1HA.

driver, but pleased that you have remembered his N.

Ramdisks

An answer to Arthur Nunn's query in Vol. III.1: a ramdisk is a means of storing files in the QL's own memory. It can be used in a similar way to a microdrive, for example, by using SAVE RAM1_test instead of SAVE MED1 _test. However, unlike a microdrive, when the QL is switched off (or reset) the ramdisk loses its contents. The advantage of using a ramdisk is speed of operation - you can save/load files to/from a ramdisk much faster than to/from a microdrive or disk drive. However, if you save anything to a ramdisk that you want to keep, always make sure that you copy the files across to a mdv or disk drive before switching off the QL.

As to where you might find a ramdisk, several floppy disk interfaces (such as Trump Card) include a ramdisk which is available as soon as the QL is switched on. Otherwise, there are several in the public domain or even available commercially - these will need to be loaded into the QL when it is first switched on, for example, by LRESPR mdv1_ramprt. Only once these latter types have been loaded into the QL can they be used for saving or loading programs.

Rich Mellor
Walsall

LX-100 Printer

In Vol. 3.3, you suggested that readers should write regarding recent printer purchases.

In March this year I was looking for a new printer and had noted in various magazines that the Epson LX-100 was advertised at around £100 plus Vat and carriage. When I saw one in an Argos store at £119, I took the plunge.

The fact that it had only a parallel port did not worry me, as I had a parallel port on my disk interface. A visit to a local Tandy store produced the correct connecting cable for £4.95, and the printer worked first time.

I think its output is very good indeed from all **four fonts** (Roman, Sans Serif, Draft and Draft Condensed). The fact that it will use ordinary A4 paper which it loads automatically from a 50-sheet cassette is a real boon.

However, I have encountered one **problem**, namely the old one of the **pound sign**! This is included in the italic character set which is supposedly accessible by changing the default settings or transmitting ESC codes from the computer. Changing the default settings sounds easy. Press the font button and switch on the power and the machine loads paper, and offers a choice of five languages in which to print out the current defaults. From here, its behaviour deteriorates, and any attempt to change these defaults results in the printer doing a full printout of all the options without giving the poor user any chance to make a choice. The ESC codes which should be the easiest method of obtaining single characters have so far baffled me, but I have hopes of working out the correct code eventually.

This is not something which is essential to my use of the printer, and generally I am well pleased with it. However, the existence of facilities which I cannot use is mildly irritating and I should be grateful if you could be of any help.

G W Rogers
Hall Lane
Sutton Lane Ends
Macclesfield

Oh Ser (1 and 2)

The 1950s were somewhat pruder than today. I recall the shock, discovering as a self-conscious teenager, that while the public face of continental loos could present two doors (ladies and gents, jsut like ours), they often led into a common area of cubicles used by both sexes. Eeek! The QL design team produces a similar deception, that my granny would have referred to as "net curtains and no drawers".

This was brought to mind on discovering that, with SERmouse inputting on SER2, it was also inputting on SER1 at the same time. Two sockets on the outside, ofe Device in the "works"?? (Try inputting to SER2, and watch COPY SER1,SCR). Could someone provide some words of wisdom on the subject, please?

It would be nice to have SERmouse and a modem working without plugging and unplugging of leads. The continental loos (in the 1950s) had a concierge to sort out the mix-up of sexes, and to show you to your "seat". Can somebody, I wonder, do the same for the SER device? Any responsibility for the association of ideas remains, of course, with my parenting.

Above effect seen on QL (JS, D16) /Minerva /GC /Hermes.

Ivan Hall
Lapford
Devon

Biros Limited!

We received a polite letter from representatives of Biro Bic Ltd., pointing out that "Biro", as featured in the reply to III.3's letter QED Search, is an active trademark of Biro Bic Ltd., and please not to use the word "biro" with a little b (which in strict grammatical terms, I suppose, doesn't really exist, unless it's Greek) as a general termfor ballpoint.

So there you are! As it happens, the Biros I had in mind are, in fact, Bic "Crystal" Mediums in blue, black and (professionally) red, to be exact, of which I have been a devoted user since the early '70s. I'm getting short of blue ones, come to think of it. There are none round here I would stoop to pinch. There is one before me even as I type, but someone's been nibbling it. I think it's one of Jim's.

Editor's notebook

I have been told that QL World must close with this issue.

Heck of a way to celebrate the QL's 10th birthday and our own second year at Arcwind.

But it was not entirely unexpected, and many of us are surprised and delighted that QL World was able to continue as long as it has.

The publisher will be writing to our subscribers. Whether QL World will rear its head again, we don't know but, if it does, it will be in a very different form. We are beyond the reach of normal commercial publishers now. But we shall see.

This will affect my life personally in a number of ways, and not without trauma. But my first thought was "Darn, and we've only got another two months to go on the New User Guide!"

I want to thank everyone, readers, suppliers, all QL people, especially the ones I won't be able to thank personally, and the publishers, for your support over the years.

Goodbye and God bless.

TROUBLESHOOTER

Bryan Davies muses on founts, and a new directory service from BT.

There have been many **founts** created for use on the QL, but too many of them have not been good. Few users will have the patience, or knowledge, to sit down and create their own founts, so any program which offers to make the job easy is welcome. The Belgian software suppliers **Progs** have released a program called "pfb2pff" (how's that for a memorable program name?) which allows Adobe Type 1 founts to be converted for use by their ProForma program. ProForma is used, and supplied, with LineDesign, and also with the lesser-known PFdata and PFlist. If you do not have any of these three programs, you can buy ProForma separately.

What is not explained by Progs in their press release is **what sources** the Adobe founts can be taken from. It is stated that _PFB files can be converted to _PFF (ProForma) files, and this may have been a misprint for .PFB, which is the PC format. Type 1 founts are common, and usually quite good.

We had a session with me demonstrating (somewhat inadequately) Line Design version 2.00B at our local Quanta sub-group meeting in May and everyone seemed very impressed with the general speed of the program and its ability to enlarge text and images without ruining the appearance of them. The performance with the **Gold Card** is very good, and it will no doubt be considerably better with the Super Gold Card. The contrast between the jaggedness of the screen presentation and the smoothness of printed output emphasised that the display really is the weak area of the QL system now.

How to Use Cueprint?

On the subject of founts, a reader asked some time ago how to make use of the fount down-loading function in the fount program **CuePrint**. Has anyone used this? In principal, it should be possible to make use of the founts provided with that program, without actually running the program itself. The printer the founts are sent to must have **memory**, to hold the founts, and the Kaga-Taxan KP-810 (and KP-910) had a spare chip socket which would take a chip supplied

What the reader was apparently having trouble with was the method of telling the printer to use particular characters from any fount that had been sent to the printer.

If there are two programs of a type, the automatic tendency is to compare one with the other and say "that is the best", but we really do not need to do that. Take Text87 and Perfection, or Professional Publisher and LineDesign, and you have pairs of programs which aim to do the same job, but which do it in very different ways. For budget reasons, most users choose one or the other but, given the freedom, it would be desirable to have all of them.

The memory now available to us makes it possible to have several major programs loaded at once, each of them available within a second or so, and all running at a sensible speed. My Gold Card system was quite happy to have **Perfection 5.14, Text87 Plus-4 version 4, LineDesign 2.00B, Files 2 (from TaskMaster) and FlashBack 2** loaded at the same time, during the Quanta session mentioned above. There were no painful lags in switching between these programs, and all ran normally. The screen did get a little confused at times, though!

Ongoing Puzzles

No information has come to light on a couple of queries. If anyone can shed any light on these problems, it would be welcomed:

1) On the **Thor**, use of the Ctrl, Shift and Alt keys with alphanumeric keys gives erratic results. The main manifestation is a long delay in response to the keypresses. Even worse, having pressed some of the combinations, the effects appear to be felt much later, after the keys have been released. This leads to unpleasant effects, such as text being deleted when least expected!

2) **FSERVE** - can this command safely be used in a normal boot file? Or should it be issued from the keyboard subsequent to boot-up? In some notes of mine (dated 1987), there was a comment to the effect that this command should not be used in a boot, and there was certainly trouble of some sort when it was put into my standard boot, so that it now has REMark in front of it. Can it affect output from the SER ports?

Odds and Ends

Budding SuperBasic **programmers** might apply to Eurotunnel. One of my recent visitors told me that the developers of the engine-management software for traction units had left the project. It may be no more than a rumour, but those of us who live alongside the rail track would welcome any contribution that would quieten the Eurostar traction units down; they make a remarkable amount of noise to go so slow! One of their noises appears to come from the brakes, which seem to be off at the front of the train but on at the rear - bet the rear end is British!

British Telecom has a facility called **Phone Base**, which is an on-line version of the telephone directories for the UK. If you have addresses and need the 'phone numbers to go with them, this system is worth investigating. There is no charge to join it, but you pay a fixed line charge; the rates when I checked a short time ago were from 2.8 to 10 pence per minute, depending upon the day and time calls are made. You need a modem, and it has to be able to emulate a VT100 terminal and work with the standard "AT" codes. This should present no problem to current modems and software.

The system is fairly easy to use, but has its drawbacks, related to its ancestry. You cannot ask for a 'phone number for someone named Jones anywhere in the country, for example. It is necessary to specify an area, and the largest area the system accepts is a County; there are quite a lot of counties in the UK, making it a lengthy (and costly) business to track down someone "of no fixed abode".

The **modem** I used when checking Phone Base was a Dataflex Pocket Gem, which is about the size of a large matchbox. You can also get modems on PCMCIA cards, little bigger than credit cards. The wonder of the size was considerably tarnished by the nine weeks it took for the modem software to arrive, from the time the device itself was purchased. Be assured that this was not from a QL supplier, though.

Obscurantism

One prime reason for hardware failing to achieve mass sales is the obscurantism practised by suppliers of certain types of product. Maybe that is the wrong word, but the dictionary describes an obscurant as "an opposer of reform and enlightenment", and that is something like what is needed. The modem field is a wonderful example of how to make a piece of hardware completely useless for the average computer user, simply by making the instructions unintelligible and far too long.

The Phone Base exercise was reminiscent of one long ago, when a set of **Tandata** units for the QL first came my way. All I wanted to do was contact one, simple service, but the instructions were almost totally irrelevant to that. It was necessary to read through pages and pages to find the odd snippets of information that related to the task in hand. Most potential buyers read or hear about this and forget the whole idea.

Looking for a cheap **24-pin dot matrix printer**? Give a thought to the **Panasonic K-XP2123**. This is a successor to the K-XP1123 and seems a better printer for the same price (£140 plus VAT, including delivery, from Novatech). A tractor feed mechanism is included, printing is reasonably quiet (there is a quiet, slower mode to make it even quieter), and setting-up is just as good - or bad as with most dot matrix printers. The controls on dot matrix printers all seem awful to me, these days, but there are a few thoughtful touches with the 2123 which ease the pain: paper can be fed in three ways; the tractor feed can be push or pull; there is an extra-cost option to print in seven colours; there is an automatic feed-in sequence for continuous paper; a Tear Off switch allows the paper to be advanced or reversed for tearing sheets off.

INFORMATION

Panasonic K-XP2123
DMP printer, £132 plus £8 delivery plus VAT:
Novatech
Blueprint 1400
Dundas Spur
Portsmouth
Hants. PO3 5RW.

Tel 0705 664144
Fax 0705 664244

QL TENTH ANNIVERSARY

EUROVOLLEYCENTER, BENELUXLAAN, VILVOORDE

BRUSSELS

Sponsored by MIRACLE SYSTEMS

Saturday 18th June 1994 10h00 - 17h00

Come to the international meeting to celebrate the first 10 years of the QL. Don't miss it - there's a mystery gift for all attendees. The new SUPER GOLD CARD will be demonstrated and on sale. Miracle Systems, TF Services, W.N. Richardson & Co. and many others will be there.

SuperBasic In Action

Simon N Goodwin extends his SuperBasic file Browser to view graphics.

This is the latest installment of the SuperBasic Browser, an easily extendable utility to simplify and speed up Qdos file operations. The program is based on the file requester developed last year, and add-on routines which appeared in the first part of this project, two issues ago.

As usual I set out to develop a useful program, and illustrate powerful and generally-applicable algorithms on the way. You don't even need to type in all the parts to find these examples useful. Many of the routines in the Browser are likely to come in handy in other SuperBasic programs.

This month's **listings** come in three parts. The first is a new version of the code at the start of the file requester, adapted to have two entry-points, NEW_VIEW and SELECTOR. These are called from WINDOZE and LOOK_AT, presented in the last episode.

The first group of lines, from 100 to 700, may look daunting but it is not as complicated as it looks. NEW_VIEW opens the menu and scroll-bar windows, reads and displays the directory. SELECTOR allows file operations to be performed once a window is ready.

Many of the lines are derived from REQUEST$, which appeared in QL World Vol. 2 issue 7 last year, and you have a head start if you have already typed that in. Some of the initialisation has been moved out of the function to the start of the program, the call to SHELL_SORT is now optional, and the lines have been renumbered.

A few other changes are required in the File Requester routines. Sorted lists are now optional, so calls to SHELL_SORT should be made conditional, dependent on the value of the 'flag' variable SORTING:

2740 IF sorting : SHELL_SORT

PROCedure CHOOSE has been extended to recognise the left and right arrow keys, which swap control to the other file window, and to call ACTION or DO_COMMAND when files are selected:

3100 ACTION com_code%, PREFIX$(path$), dir$(here%)
3120 =27,200,192 : EXIT poll : REMark here%=0 removed
3125 =REMAINDER : DO_COMMAND

```
100 REMark SuperBASIC in Action FILE REQUESTER updates
110 REMark By Simon N Goodwin for Sinclair QL World
120 REMark Version 2.0, May/June 1994; Toolkit usage:
130 REMark ALCHP, ANYOPEN%, CHAN_W%, CURSEN, CURDIS, EDIT$, FPOS, FLEN,
135 REMark GetHEAD, INPUT$, MORE, MOVE_MEMORY, NEWCHAN%, RECHP, REPORT,
140 REMark RENAME, SET_POSITION, SET_PRIORITY, SPL, SPL_USE, STRING%,
150 REMark SUSPEND_TASK, TYPE_IN
160 REMark Two TURBO compiler optimisation directives follow:
170 IMPLICIT% current, i,j,k,n,d,type, row,pixelLine
180 DATA_AREA 40
190 :
200 max_files%="480 *=MaxFiles" :REMark Generous for 720K disks
210 name_Limit%=36 :REMark Standard maximum for Qdos directories
220 sorting=1 : picking=1
230 size_x%="0 *=XcSize" :REMark 0 or 2 in MODE 8/12; 0 to 2 in MODE 4
240 size_y%="0 *=YcSize" :REMark Configurable to 0 or 1 (double height)
250 dir_type%="255 *=DirFileType" : type_mask%=255 : pick_mask%=256
260 SPL_USE "ser1" :REMark Target device for PRINT spooling (or PRT1)
270 :
280 WINDOW #0,480,40,24,216 : PAPER #0,0
290 WINDOW 476,216,24,0 : PAPER 0 : INK 7 : BORDER 2,2
300 CLOSE : MODE 4 : REMark or 8 or 12 if sizes permit
310 WINDOZE 2 : STOP
320 :
330 REFERENCE path$,dir$(0,0),flag%(0)
340 DEFine PROCedure NEW_VIEW(status%,edge%,path$,top%,text_Lines%,dir$,flag%)
350 REMark SuperBasic in Action Requester modified for Qdos BROWSER
360 REMark STATUS% = report window # (2 by 36 characters or more)
370 REMark EDGE% = X offset, TEXT_LINES% = eponymous window height
380 REMark MARK% = select default; PATH$ = drive/directory
390 REMark TOP% = first pixel line; opens #MENU% & #SCROLL_BAR%
400 LOCal margin% :REMark LOCAL width%,height%,border_colour% etc.
410 CSIZE #status%,size_x%,size_y%
420 char_x%=CHAN_W%(#status%,38)
430 char_y%=CHAN_W%(#status%,40)
440 :
450 menu%=NEWCHAN%
460 border%="3 *=BorderWidth" : border_colour%="50 *=BorderColour"
470 width%=char_x% * (name_Limit%+1) + border% * 4
480 height%=char_y% * text_Lines% + border% * 2
490 margin%=edge%-border%*2
500 OPEN #menu%,"SCR_" &width% &"x" &height% &"a" & margin% &"x" &top%
510 :
520 scroll_bar%=NEWCHAN%
530 OPEN #scroll_bar%,"SCR_8x" &height% &"a" &(2+width%+margin%)&"x"&top%
540 PAPER #scroll_bar%,2
550 width%=width% - border% * 4
560 :
570 mark%=0
580 GET_DIR
590 here%=0 : Line%=here%
600 TIDY_MENU
610 IF sorting : SHELL_SORT
620 FILL_WINDOW here%
630 END DEFine NEW_VIEW
640 :
650 REFERENCE path$,dir$(0,0),flag%(0)
660 DEFine PROCedure SELECTOR(status%,path$,text_Lines%,dir$,flag%)
670 REMark Parameters as above, but fewer; uses MENU% & SCROLL_BAR%
680 CURSEN #status%
690 CHOOSE
700 END DEFine SELECTOR
```

New Commands

The **second** part implements another five Browser commands: EDIT, GRAPHICS, INFO, MOVE and PRINT. MOVE simply calls the subroutines for COPY and DELETE (coming soon) while INFO calls SHOW_INFO, from the last episode of SuperBasic in Action.

PRINT uses the Toolkit 2 SPL command to copy the selected file to the default spool device, usually set with SPL_USE to "SER1", "PRT" or "PAR" depending on your printer. SPL opens the file and copies it 'in the background', leaving your system free for other tasks. If you lack Toolkit 2, and you don't mind waiting for printout to complete, you could use something like:

```
7190 REMark EDIT command subroutine
7200 CURDIS #0 :REMark Allow task to grab keyboard input
7210 EXEC "FLP1_HISOFT" :REMark For example Hisoft Devpac 2
7220 SUSPEND_TASK 20 : TYPE_IN CHR$(10) & CHR$(255) & "L"
7230 SUSPEND_TASK 20 :REMark Wait for filename input window
7240 TYPE_IN drive$ & file$ & CHR$(10):REMark File to load
7250 CURSEN #0
7260 RETurn
7270 :
7280 REMark GRAPHICS command subroutine
7300 SAVE SCREEN
7310 ch%=NEWCHAN%
7320 OPEN_IN #ch%,drive$ & file$
7330 MORE_GRAPHICS
7340 CLOSE #ch%
7350 RESTORE_SCREEN
7360 RETurn
7370 :
7380 REMark Show INFOrmation about file
7400 SHOW_INFO drive$ & file$
7410 RETurn
7420 :
7490 REMark MOVE
7500 GO SUB 7000 :REMark Copy
7510 GO  TO 7100 :REMark Delete original
7540 :
7590 REMark PRINT to default SPL device
7600 SPL drive$ & file$ : RETurn
7610 :
```

COPY DRIVE$ & FILE$ TO "SER1"

The EDIT command is set up to call HiSoft's Devpac editor, but the code is adaptable for other editing tasks. Devpac does not take a file parameter so Browser uses timed TYPE_IN commands to If you lack SUSPEND_TASK and TYPE_IN (from Turbo Toolkit) you can substitute the standard PAUSE command and use the DIY Toolkit QUEUE% function to simulate keyboard entry.

EDIT starts by temporarily turning off the cursor in channel #0, as we want the new task to grab input when it starts. Then it loaded the editor with an EXEC command, and waits a bit for it to start up and grab control of the keyboard.

Like many Qdos editors, Devpac expects the user to specify its buffer size before editing can commence. TYPE_IN queues an Enter character, CHR$(10), to accept the default, then types ALT L (CHR$(255) & "L"), the keypress to load a new file.

Another short delay is needed to give Devpac time to process these signals and swap input to the second window, where file names are entered. The delay time of 20 frames, about 400 milliseconds, is plenty for this Gold Card QL but may need to be extended for a slow or busy machine.

Finally Line 7240 enters the drive and file name for loading. Devpac loads the file, and Browser can continue with its cursor re-enabled in the lower window.

You can do much the same thing with other editors, like QED, EDT, SPY, Metacomco's ED, QD, Arced and The Editor. All you need to do is answer any start-up questions, and replace the ALT L pattern with the key codes to select "LOAD" in your editor.

If you own Toolkit 2 or some other extended version of the EXEC command, it is particularly easy to call the Public Domain QED editor, because it accepts a file name as a task parameter:

7210 EX "FLP1_QED_EXE"; drive$ & file

This loads the editor and the chosen text file, with no need for subsequent SUSPEND_TASK and TYPE_IN commands.

The graphics file viewer works like DIY Toolkit's MORE command for text, is compatible with Minerva's two screens and can easily be extracted for use in other programs. It consists of two routines: MORE_GRAPHICS reads bytes from #CH% and displays in windows #0 and #1.

GRAPHICS_LINE is used to read each line from the file. If the file has less than one line left, it is filled with null characters, CHR$(0), to pad the line with black pixels.

Line 9900 generates a diagonal striped pattern after the end of the file, using a different character-code in the cyclic binary sequence 1, 2, 4, 8, 16, 32, 64, 128, for each line. These are more useful than nulls when you're looking at a file with blank lines at the end, and need to know where the real data stops.

Graphical Browsing

MORE_GRAPHICS lets you scroll back and forth through any file, seeing its contents as Qdos graphics. This is a quick way to establish the internal structure of a file, as i'ts easy to see the difference between code, data, graphics and text and you get more information on each screen than is possible with numeric or textual displays.

The routine shows the location reached in the file at the bottom of the screen, along with the file size in bytes, and you can move to any offset within the file by pressing Enter and typing in a new offset for the display to start.

You can scroll back and forth a page at a time by pressing Alt-up or Alt-down, just as with the MORE command. The strange characters in line 9520 are the DeskJet's interpretation of Qdos vertical arrow characters; I printed the listing on a JM QL, which lacks the TRA command to translate such characters from Sinclair into HP codes. Line 9550 calls MINIM, a SuperBasic version of the MINIMUM function, to find the least of its two parameters.

The down arrow key scrolls forward a line at a time, so you can smoothly scroll to any line of the image. This is important as many files have more pixel lines than can appear on screen at one time alongside the prompts, file name and position display.

Line 9750 uses MOVE_MEMORY to move the previous display up by one pixel, making room for a new line at the bottom: TOP+LINES-1. Paging and scrolling goes much faster after the file has been read once, because Qdos Slave Blocks largely eliminate the need to re-read the disk.

The height of each graphics page depends on the height of SuperBasic's window #1, read from the Qdos channel definition with the CHAN_W% function from DIY Toolkit Volume C. Alternatively you can emulate this function with calls to PEEK_W and CHBASE (Volume Q). Real hackers can probably get away with direct PEEKs, as long as they steer clear of QRam, QPac, and the Thor windowing system, which change the channel offsets.

The graphics display uses the full width of the QL screen - 256 pixels in Mode8, or 512 in Mode4 - as this ensures that screen images are correctly aligned, even if the left hand edge is invisible on a TV, as is usually the case.

The QL was originally designed to run at a clock speed of 8 MHz, but this was cut to 7.5 MHz at a late stage when Sinclair found that

the ZX-8301 display chip had trouble with the higher speed. The result was that each pixel was output for slightly longer than anticipated, so a whole line was too wide for most TV screens. Monitors usually need less time to 'fly back' to the start of a new line, which is why they can display the full width, even at 7.5 MHz.

MORE_GRAPHICS reads and displays lines of 128 bytes with the INPUT$ toolkit function. It ignores the width of window #1, so normal screen images are correctly aligned from one line to the next. The default full-screen width is compatible with files saved by EyeQ, GraphiQL, Open World, Painter, QL Paint, QSpec, Quick Mandelbrot, Screen Snatcher and most other Qdos pixel graphics programs, as well as simple SBYTES commands.

A few programs use a different width for pixel lines, so their images appear sheared diagonally across the screen. This affects vintage M-Paint files, which reserve a slice down one side of the screen for icons and patterns, and the FISHCOILS_WIDE image in the Public Domain Escher Graphics disk, which was converted from a US system, preserving its 640-pixel line-width.

If you want to display these files correctly, or use a wider screen on a Qdos Emulator, you should change the value 128 in the program to suit the number of bytes per line in your images, and pad or truncate input lines to fit your chosen window.

Not Just Graphics

MORE_GRAPHICS is useful even if the file does not contain graphics, because it's a quick way to determine the structure inside the file. Empty areas appear as black rectangles, such as the Channel and Vector Table spaces inside Turbo tasks, code appears as a random mush - like the initial QL screen when you turn it on, which consists of rom code - and data usually reveals its organisation by the pattern it forms on screen.

If you view a Quill document as graphics you'll see the Ascii text at the start, followed by columns of paragraph table data. At a glance you can see the proportion of extra information added to keep track of the text formatting. It is even possible to distinguish areas of CAPITALS, blank space, lower case and digits by the pattern on the screen.

Founts can be distinguished, although they are scrambled horizontally as each character definition uses only nine bytes. Look for the script founts embedded in Psion Quill and Xchange, which appear as a band of heiroglyphics in the file.

Text appears as columnar stripes, because bit 7 is clear for seven bit Ascii characters, lower-case letters have bit 6 set, and so on. Groups of characters form distinctive patterns that are much easier to recognise than they are to describe.

Some program files, like Speculator_code and DJC's Quick Mandelbrot task, have graphic screens imbedded inside them, as soon becomes apparent when you view them with MORE_GRAPHICS. The Psion game Match Point contains a complete Mode4 screen backdrop at offset 37100 in the MATCH2 file.

It is unlikely that such images will start on a 128-byte line boundary, so you will probably need to enter a new start offset to get the image correctly lined up - otherwise it will appear sliced down the screen at the point where one line ends and the next one starts.

Qdos graphics are 'word-aligned' - in other words, it takes two bytes to describe each group of pixels - so the offset should generally be even, or mono graphics will be 'ghosted', with red and green parts offset by eight pixels. To see this, set an odd offset, like one or three, while viewing a black and white graphics file in Mode4. It's a bit like viewing a 3D film without the coloured glasses.

Loose Ends

You now have the majority of the source code for the SuperBasic Browser, and a handful of procedures and functions which are useful in their own right. The project goes on to routines to copy, insert and delete files and directories.

```
9380 DEFine PROCedure MORE_GRAPHICS
9390 LOCal aPage,k,k$(10),lines,fileLen,row,target,top
9400 REMark Reads graphics from #ch% & sends prompts to #0
9410 REMark Display is full-screen width in #1 vertical area
9420 REMark Assumes 128 byte lines in file & video memory
9430 REMark Uses current screen in Minerva F3/F4 64K mode
9440 top=CHAN_W%(#1,26)    :REMark First line of Window
9450 lines=CHAN_W%(#1,30) :REMark Window pixel height
9460 fileLen=FLEN(#ch%) : aPage=lines*128 :REMark Bytes/Page
9470 INK #0,4
9480 PRINT #0;"Browser Graphics file viewer - use keys"
9490 IF aPage>=fileLen
9500   PRINT #0;"ENTER, SPACE or ESC to return to the menu"
9510 ELSE
9520   PRINT #0;"¬¥ to move, +ALT for pages, ESC to Exit"
9530 END IF
9540 INK #0,7 : AT #0,2,0 :REMark Backdrop for prompt
9550 PRINT #0;MINIM(aPage,fileLen),"  of"!fileLen!"in"!file$;
9560 REPeat page_view
9570   FOR row=top TO top+lines-1 : GRAPHICS_LINE row
9580   IF aPage>=fileLen : k$=INKEY$(#0,-1) : EXIT page_view
9590   REPeat fine_view
9600     AT #0,2,0
9610     PRINT #0;FPOS(#ch%),"  ";
9620     k=CODE(INKEY$(#0,-1))
9630     SELect ON k
9640       =27 : EXIT page_view
9650       =10 : AT #0,2,0 : k$=EDIT$(#0,FPOS(#ch%),10)
9660           CURSEN #0 : IF "ee" INSTR k$ : NEXT fine_view
9670           IF k$="" : NEXT fine_view
9680           IF k$<"0" OR k$>fileLen & "" : NEXT fine_view
9690           SET_POSITION #ch%,k$ : EXIT fine_view
9700       =209 : target=FPOS(#ch%)-lines*128*2
9710           IF target<0 : target=0 : REMark Page to top
9720           SET_POSITION #ch%,target : EXIT fine_view
9730       =217,32 : REMark Page down, easy default case
9740       =216 : target=top*128+SCREEN_RAM
9750           MOVE_MEMORY target+128 TO target,(lines-1)*128
9760           GRAPHICS_LINE top+lines-1 : NEXT fine_view
9770       =REMAINDER : SUSPEND_TASK 10 : NEXT fine_view
9780     END SELect
9790     EXIT fine_view
9800   END REPeat fine_view
9810 END REPeat page_view
9820 END DEFine MORE_GRAPHICS
9830 :
9840 DEFine PROCedure GRAPHICS_LINE(pixelLine)
9850 LOCal left,target
9860 left=fileLen-FPOS(#ch%)
9870 target=SCREEN_RAM+128*pixelLine
9880 SELect ON left
9890   REMark If the file is exhausted, show a stripey pattern
9900   =0 : POKE$ target,FILL$(CHR$(2^(pixelLine && 7)),128)
9910   =1 TO 127 :REMark One incomplete line remains; pad it
9920     POKE$ target,INPUT$(#ch%,left) & FILL$(CHR$(0),128-left)
9930   =REMAINDER : POKE$ target,INPUT$(#ch%,128) :REMark 1 line
9940 END SELect
9950 END DEFine GRAPHICS_LINE
```

The NEW USER GUIDE

Concepts Section

Section Thirty-Six

This month the Concepts Guide explores QDOS further.

DATA TYPES, IDENTIFIERS AND VARIABLES

SuperBasic data can be stored on the QL in one of a relatively limited number of ways, called **data types**. Most data types can be represented by **identifiers,** which are sequences of letters and numbers that follow strict rules. The most often used class of identifiers comprise **variable names**, but other classes control loops, identify user-defined routines and name devices.

All data can be referred to as an **absolute value** or a **variable value**, ie one represented by a variable name. The statement PRINT "Hello" includes an absolute value of "Hello" whereas PRINT text$ refers to a **variable string** that might represent a different set of characters each time it is executed.

Strings are sequences of zero, one or more characters (up to a theoretical maximum of 32,766). **Absolute strings** are enclosed using matching single or double quotation marks. If a string is bounded by double quotation marks it can include single quotes within it, such as "Don't touch Mike's computer". The reverse is also true, so that 'Mike said "Do not touch" ' is a valid string. A string both bounded by and including the same type of quotation marks will be rejected by the interpreter. Strings can comprise any selection of characters from the full Ascii character set, although the effect that some of the non-printing characters have on the screen might not be all that is desired. A special sort of string, called the **nul string**, has no characters in it at all.

Floating point numbers can comprise the digits 0 to 9, the decimal point and, optionally, a unary plus or minus. **Floating point numbers** have 8 significant digits and range from the infinitesimally small (10 raised to the power of -615) to the impressively large (10 raised to the power of 615), both positive and negative. Floating point values are stored internally in a six-byte sequence. Sadly, numerical output is limited to 5 significant figures before being automatically converted to scientific (**exponential**) notation, such as 6.2345E4. The relatively low point at which numbers are coerced into scientific notation is a major QL weakness, especially in financial applications.

Whole number values, or **integers**, can be represented in a different way to floating point values. Integers are limited to the range of -32,768 to +32767, indicating that they are stored in just two bytes. However, the QL does not make much use of the integer type. All constant numbers are represented internally in floating point format and all arithmetic is carried out using floating point formats. This means that instead of integers and integer arithmetic speeding up time-critical processes, as would be the case on all other computers, the QL is actually **slowed down** by them as it suffers from the overhead of having to translate all integer values into floating point values before it can do anything with them. This is not true of programs compiled with **Turbo**: these benefit a great deal from the judicious use of integers, particularly to control loops. The difference in speed is very marked, even for quite small numbers of iterations, and is well worth the clever trickery needed to make the SuperBasic interpreter think it sees floating point control variables while the Turbo compiler knows differently.

SuperBasic **names** are used to identify devices such as microdrive files, screen windows, serial ports and network addresses. Strings can be coerced into names and carry less of an overhead in the Qdos name table. COPY flp1_myfile TO scr_ and COPY "flp1_myfile" TO "scr_" are therefore equally acceptable, with the latter having the slight edge in conserving memory.

SuperBasic has no **logical data type** such as the TRUE and FALSE in BBC Basic. Instead, logical true and false are represented by non-zero and zero values respectively. Three of the most efficient ways to represent logical values are: to use **integer variables** holding 1 for true and 0 for false; to use a **character variable** holding "1" or "0" that can be coerced to a numeric value; or, most efficiently, to use a **single character** to represent up to eight logical states measured using bitwise operators. The memory overhead for these methods is, respectively, two bytes per logical value, one byte per logical value and, best, one byte for up to eight logical values.

Identifier names, including variable names, must begin with a letter and can then include further letters and digits and can also contain underscores. Names for devices begin with a prefix identifying the type of device, such as FLP for a floppy disk drive. Identifiers are not case sensitive, so THISVAR is logically identical to ThisVar and thisvar. The maximum length of a variable name is 255 characters, all of which are significant. Identifiers cannot be the same as **reserved keywords**, nor can they be the same as the capitalised parts of control keywords (eg def, define, proc and procedure are all illegal because they conflict with the keywords DEFine or PROCedure). This limitation applies to file names used without drive prefixes unless they are enclosed in quota-

tion marks. Interestingly, file names can include all sorts of normally illegal characters, including spaces, provided they are declared in a string. Finally, for obvious reasons, variable names cannot begin with Qdos device identifiers, such as mdv1_.

SuperBasic, like most other Basic dialects, has **typed variables**. This means that the presence (or absence) of a suffix to the variable name determines the sort of information that it can represent. Variable names without a suffix represent floating point numbers. If suffixed by a percentage sign, ie wholenum%, they represent an integer value. Strings are represented by variable names that end in a dollar sign, such as Text$. Names are not represented directly by a variable type, but are easily coerced from strings.

Array names must follow these rules and are restricted to holding data types consistent with the array name suffix. Programmers looking for some of the flexibility of the C 'struct' multi-type data construct can develop two-dimensional string and numeric arrays that match row for row, so that CUSTOMER$(32) and BALANCE(32) refer to the same customer. Alternatively, programmers emulating **dBase multi-type fields** in a database application might experiment with a two-dimensional array of very long strings containing fixed-length fields within it. For instance, the first thirty characters might be the customer name, the next eight might be the current account balance, the next fourteen the telephone number and so on. Functions need to be written to convert the string representation of numbers into numeric format for calculations and to replace the rather tedious string slicing syntax with something a little more user-friendly.

Loop and branch identifiers have a superficial similarity to variable names, but there are some special rules to consider. While the control variable in a FOR...NEXT loop has a value - indeed, without it the construct would be worthless - the **control identifier** (note, not a variable) for a REPeat loop does not. The expression in an IF statement can be based on any data type as all expressions equate to true or false, or non-zero and zero. The control variable in a **SELect statement**, however, must be of the floating point type: another huge weakness for SuperBasic.

Digital Precision gets round these restrictions using the IMPLICIT family of keywords. Should you wish to test a string variable using a SELect structure, simply include a command such as IMPLICIT$ MyString prior to giving MyString a text value and using it in the SELect construct. Life is even easier for **Minerva** owners as Minerva SuperBasic accurately handles integers and strings in its SELect statements.

DIRECT COMMAND

For many QL owners, **direct commands** are as near to programming as they feel they need to get. In effect, a direct command is a one-line program that performs one simple duty, often something mundane like loading a program file, changing the screen resolution or listing the contents of a microdrive. Some computers have a command line language separate from the primary programming language (step forward, MS-DOS), but the QL avoids this unnecessary duplication by **mixing** programming commands and operating system commands into the one language, SuperBasic.

The distinction between a direct command and a program command is simple: **direct commands** have no line numbers preceding them, while **program commands** must begin with an integer line number in the range 1 to 32,766. Program commands are collected to be carried out in line number order (jumps, loops and branches permitting) while direct commands are carried out the instant the Return key is pressed.

Because SuperBasic can **concatenate** several statements on one logical line by separating them with colons, the capabilities of a direct command are actually quite extensive. Short form structures can allow loops and branches, for instance, as long as they are properly nested. The disadvantage of trying to enter lengthy multi-statement lines is that a typing error will force you to rewrite the whole thing again. That is, unless you own Super Toolkit II and remember that the Alt-Enter combination retrieves the previous line.

Programmers quickly latched on to another way of concatenating direct commands. They simply opened a file and printed to it a series of commands, each on its own line. By loading the file as if it was a SuperBasic program, the command interpreter is forced to carry out each unnumbered command as if it had been typed directly at the keyboard. The main advantage is that no memory is occupied by a program as each line is discarded as soon as it has been executed. The technique is ideal for **boot files** as these rarely need complex multi-line structures and memory conservation is paramount.

By and large, **statements** are equally at home in programs as they are when used directly. Some commands are of fairly limited value in programs, such as RUN and EDIT and some statements are meaningless as direct commands, such as DEFine PROCedure.

ERROR HANDLING AND PROGRAM DEBUGGING

For most QL programmers, program errors are to be avoided at all costs because they inevitably bring programs to an unexpected halt with nothing more than a gnomic comment and a curse from the user. For errors caused by poor programming, there is only the programmer to blame, but users can accidentally crash otherwise perfectly-mannered applications by, for instance, ignoring a request to place a cartridge in a microdrive.

Other programmers have discovered the freedoms given by a properly implemented **WHEN ERRor** command (or its Turbo equivalent, the wittily titled WHEN_ERROR). Using this event-driven procedure definition, whenever an error occurs the SuperBasic interpreter scuttles across to some code that should be able to recover from the error without halting the program. With this facility, all fatal errors can fairly be blamed on the programmer alone.

Even the earliest QL versions had WHEN and ERRor as reserved keywords, and later variants actually included some code to support them, but the only reliable error trapping is provided by **Turbo Toolkit** (supported by whatever QL rom you care to mention), the **Minerva roms** and QLs with **Super Toolkit II** hanging off them.

Compared with some operating systems and applications that have hundreds of error codes, SuperBasic manages quite adequately with a miserly twenty-two.

Late models of the QL rom included new keywords to handle errors. These have been copied across to Minerva roms and their stability enhanced. ERLIN, for instance, is

a function that returns the line number on which an error occurred. ERNUM will report an error code between -1 and -21 that identifies the type of error. ERR_NF is an example of the error-specific functions: it returns true if a device was "not found". The REPORT command translates error codes into the appropriate message. REPORT by itself gives the message appropriate to the last error. Alternatively, if followed by a valid error number it prints that message. REPORT #2, -13 causes "Xmit error" to be printed in the listing window. A full list of **error codes** has already been published in the alphabetical section of the New User Guide (under the keyword **ERLIN**). An informative Super Basic article on the subject of incorporating error-handling code into programs was published in QL World June 1990.

Error handling depends on the presence of a WHEN ERRor clause (or the equivalent WHEN_ERROR variant in Turbo Toolkit). Within this clause it is important that errors cannot possibly occur because recursive calls to the WHEN ERROR block are impossible to untangle and may crash the system. Particularly if the error was related to file access, it might be necessary to ask the users if they wish to try the process again or abandon it. The decision can then be passed back to the routine in which the error was noted and the program flow adjusted to suit.

The interpreter can be guided out of a WHEN ERRor block using the RETRY or CONTINUE commands. RETRY attempts to execute the command that caused the problem to occur, whereas CONTINUE restarts program execution at the line following the faulty one. Neither offers all the answers to trouble-free error-handling, so Turbo users have the luxury of setting RETRY_HERE statements in their code. When an error occurs in a Turbo program the program flow is directed to the WHEN_ERROR block. When a RETRY command is reached the next line to be executed is the one immediately after the most-recently encountered RETRY_HERE command. This arrangement will only trip programmers up if they do not update the RETRY_HERE pointer at appropriate places.

Both Minerva and Turbo include ways of helping programmers **debug code** so that run-time errors are reduced to the mainly file-related problems that programmers can do nothing about. Minerva includes the command TRON to set a **tracing facility** on. As a program is run, the line number and statement number of the command currently being executed is displayed on the screen. The facility is removed with the command TROFF so that programmers can isolate problematical areas of the application to trace through. The speed of execution is often so fast that the true cause of faults is passed before the program stops with an error message. In these circumstances the **Minerva** command **SSTEP** comes into its own. When issued, SSTEP forces the interpreter to wait after each command is executed until the user presses a key.

The **Turbo Toolkit** comes with example routines developed using Turbo SuperBasic extensions. Two of those are relevant to the problems of debugging code. HOW_COME lists all the procedure calls that brought the interpreter to a particular part of the program. This is invaluable for determining where variables were set or changed or under what conditions subroutines are reached. The Toolkit package also comes with an implementation of TRACE that prints the entire program line in the command window. The utility TURBO_TRACE performs a similar function for programs after they have been compiled.

Turbo also includes routines for listing the procedure and function definitions in a program and for "profiling" programs in a way that identifies where the speed-critical parts of the application lie.

EXPRESSIONS

Expressions are the life-blood of programs. They store, manipulate and transport information. At their simplest they reflect a single value, but at their most complex they combine several values and functions linked with operators or nested in parentheses. Larger expressions can always be broken down into constituent expressions.

Expressions take three basic forms. The simplest, **atomic**, expression is formed from a constant, a variable, an array element of a function. "Hello World", MyFileName, Player$(12) and Area(xlen, ylen) are all examples of atomic expressions. Note that expressions can all be typed as string, integer, numeric and name, in line with the rules for identifiers described earlier. Typing is determined by the value that an expression represents, not necessarily the same as the type of the constituents it might contain. LEN(Text$), for instance, returns the length of the string Text$: it is a numeric expression even though it includes a reference to a string.

Atomic expressions can be linked with **operators** to form the sort of expression that a mathematician would recognise, such as Xlen * Ylen + 6. Most operators link numeric atomic expressions, but a few link strings.

An expression might include a **unary operator**, one that is followed by an atomic expression but not preceded by one. The expression -7 is formed from a constant preceded by a unary minus, for instance. The three unary operators are **plus, minus and the Boolean operator NOT**. In expressions that lack a unary operator, plus is assumed. See the "Operators" topic for details of the 26 operators recognised by SuperBasic.

The third class of expressions are those enclosed in parentheses that return **a value of true or false** according to their contents. PRINT (X = 8) will cause a zero to appear if the variable X is not equal to 8, otherwise a 1 will be printed. Several such expressions can be tested to see if they are all true by multiplying them together, or tested to see if any one is true by adding them together.

Expressions can form the parameters of commands or the arguments of functions, or their result might be assigned to a variable and so appear on the right hand side of an equation. Because functions can have expressions as arguments and are themselves atomic expressions, **complex expressions** can be broken down recursively into ever-smaller expressions. The following example begins to show just how complicated an expression can get:

```
PRINT#3, Text$(4 TO 8) &
Forename$(Decode$(UserCode)) & FILL$("..", WinWi
dth(3) + 17)
```

The constituent expressions are:

```
Text$(4 TO 8)          (Despite its appearance, this is
an atomic expression)
Forename$(Decode$(UserCode))
        Decode$(UserCode))
```

```
                UserCode
FILL$("..", WinWidth(3) + 17)
          ".."
        WinWidth(3) + 17
              WinWidth(3)
                    3
              17
```

Expressions are sometimes confused with **equations.** Equations always include a **comparator** (such as the equals sign) separating two expressions. In programming, the expression on the left of an equation is most often a single variable to which the result of the expression on the right of the equation is being assigned. However, equations in brackets and within IF statements are treated as logical expressions that return true or false. This means that:

```
IF Xval + 7 = 19        :is a valid clause
LET Xval + 7 = 19       :is not
```

FUNCTIONS

A function is often described as being a factory that accepts expressions as its raw materials and manufactures another expression as a finished product. The simplest of such functions is SQRT(x) that takes any number, represented by the variable x, and converts it into its square root.

Some functions do not always need an argument passed to them, such as EOF(). One function, PI(), always produces the same result and is thus more akin to a system constant. In SuperBasic it is possible to dispense with the **brackets** following a function with no parameters, but most programmers find code easier to read if the status of every function is identified by the presence of parentheses.

If a function needs one or more arguments, the brackets around the arguments are compulsory. This clearly distinguishes them from procedures, which do not have their parameters in brackets. As explained in the earlier section on expressions, any function argument can itself be a function. This concept is nesting, where functions contain functions that contain functions. The difficulty with **nested functions** is to have the right number of left and right parentheses and have them in the right places.

If a function needs several arguments, such as FILL$(string$, chars), the arguments are separated by commas. In a few special cases readability can be improved by replacing some or all of the commas with the keyword TO. The SuperBasic syntax checker usually treats TOs and commas identically in argument lists.

SuperBasic allows programmers to define their own functions. A function definition begins with a DEFine FuNction line that includes the name of the function and, in brackets, any formal parameters that may be necessary. The name of the function must **match the type** of the value to be returned from it, so that the name of a function returning a string must end with a dollar sign, and so on. **Formal parameters** are local variable names that represent the data values passed to the function. A key difference between formal parameters and normal variables is that they take their type from the value passed to them and do not need to follow the normal rules of appending a dollar sign or percentage sign to indicate a string or integer variable.

When a user-defined function is called, values called **actual parameters (or arguments)** are passed in strict sequence and with a one-to-one match to their equivalent formal parameters in the opening line of the definition. If the parameter is a single variable, any changes to the formal parameter are reflected in the actual parameter. Programmers describe this as passing variables **by reference.** If the actual parameter being passed is an expression then its value alone is passed to the function: any changes to the value of the formal parameter within the function definition have no effect on the outside world. This is called "**passing by value**". Arrays are always passed by reference.

To show the impact of these rules, let us assume that a string is passed to a user-defined function and that during the course of the definition it is necessary to remove all the spaces from the string. Once the function was finished, will the string have spaces in it or not? Well, with a call like X$ = Split$(String$, 5) any damage done to the variable String$ inside the function definition will persist. If the call had been X$ = Split$((String$) , 5) then anything could have happened to the formal parameter representing String$ inside the function and no change would be seen to String$ after the function was complete.

Turbo treats array and expression parameters in the same way as SuperBasic, but turns the default for simple variables on its head. Without special action from the programmer, variables in **Turbo-compiled code** are passed by value. To pass them by reference the DEFine FuNction line must be preceded immediately by a REFERENCE statement listing those parameters in the DEFine line that are to be treated as being passed by reference. This must always be done prior to passing an array because all arrays must be passed by reference. An array name in a REFERENCE statement must identify how many dimensions it has, for instance REFERENCE Player$(0,0,0). The number of elements is disregarded, so zeroes are as good as anything else.

At the outset of a **function definition** programmers can opt to declare one or more local variables for use within the definition. Even if these identifiers occur elsewhere , SuperBasic ignores any previous value associated with the variable. Once the definition is left, the previous value for such variable names is restored.

Function definitions can include the full range of SuperBasic statements and structures, although it is always considered bad practice to define a function or procedure within another user definition, simply because it makes the program code difficult to read. The aim of a function definition is to produce some value that can be returned to the expression from which it was called.

The last active line of a well-written function definition must always be an unconditional RETurn statement. In functions, RETurn always takes a parameter. This might be a variable (often called RESULT, for obvious reasons) or a more complex expression. A minimalist function would therefore be a DEFine statement followed by an unconditional RETurn statement, such as:

```
DEFine FuNction Increment (xval): RETurn xval + 1
```

It is possible to pepper a multi-line function definition with several conditional RETurn statements with IF or SELect structures determining which, if any, of the RETurns to activate.

DEA PLUS 3 V5.20

Since V4.07 of DEA (an intelligent disassembler) was reviewed in QL World April 1992, the program has undergone changes to bring it up to its current impressive standard. If you do not know what an intelligent disassembler does, please refer to the 1992 review for full details.

Simply, DEA attempts to take a finished machine codeprogram and convert it back to the source code in which it was written , (assembly language). This is akin to taking a washing machine and producing a blue print of it.

The manual (currently 54 pages laser-printed) has been significantly rewritten and is now much easier to understand, and even has a tutorial for new users. It also has a 'beginner's corner' to point you in the right direction.

Tutorial

The 9-page tutorial gives a step-by-step guide to loading the program and using it to disassemble the whole of the Turbo runtime toolkit (supplied). Users who know their keyboards should be in no doubt as to which key to press at each stage and will probably be amazed at how little effort can produce a full source code - in fact, DEA can parse 99% of the whole file without the user having to touch a key! The tutorial then goes on to show how DEA can be used to extract one (or more) keywords from within the whole Turbo toolkit (or any other toolkit); how to go about disassembling the Gold Card rom; and how to extract a keyword from the QL's rom. I found this part of the manual extremely well written and can only hope that other software houses will pay as much attention to new users.

Rich Mellor runs a highly effective upgrade of the Intelligent Disassembler.

Most improvements to the main program are in parsing the machine code file (to ascertain which areas of the file are machine code and which are data). DEA now recognises standard Qjump configuration blocks and Thing headers, as well as automatically recognising word and byte length strings, C-type strings, SuperBasic definition tables and general assembler code. In order to reduce the likelihood that DEA will recognise a block of data as the wrong type, DEA 5.20 now has a 'trial parsing mode'.

Parse Levels

Normally, DEA works through a machine code file, disassembling from the start of the file (or a specified start offset), and following any machine code branches, returning to the main code as it goes along, allocating labels as necessary to any parts of the code referred to. Having done this (Level 1 parsing), DEA then searches the file for Qjump configuration blocks (Level 2) and, if found, will try to disassemble its structure (although this is still primitive in my current version). After Level 2 is Level 3, where DEA looks at all labels which have been allocated to the machine code file but not yet decoded. A label could point to a machine code routine, a block of data, some text or any other data-type supported by Qdos. DEA uses a trial parsing mode, which enables it to follow the flow of data pointed to by the label and decide how it should be classified.

Levels 4 and 5 are used by DEA to look for blocks of machine code which may not be referred to elsewhere, and for any strings embedded in the machine code. If any new labels are created while parsing under these Levels, control is returned to Level 3. Having exhausted these avenues, DEA will look again at any Labels which have not yet been decoded and try to decide if these labels can be safely assumed to be byte data blocks (Level 6).

As a final check, control is then returned to Level 3 so that DEA can have another look at the remaining blocks of code.

It is only when DEA has progressed through this sophisticated multi-level parsing' that the user is called on to take any action. This is Level 7, and the user must look at the remaining blocks of code and decide how to classify them. You will not have much to do, as tests showed DEA decoding over 80% of all but the most complex programs by this stage.

Better Level 7

Level 7 parsing has been significantly improved - you are now presented with both the disassembly of the start of the unknown block of code and a hex/Ascii dump of the block. You can then either use the cursor keys to move through the assembly listing, or tab and the cursor keys to move over the dump. You can specify the start and end of data blocks by . plus Space, or simply use Space to identify the start of some code. Once identified, you are presented with the data-type menu from which to select a code type for the highlighted block. DEA will always try to guess the most appropriate data-type to be used and automatically place the cursor bar there in the menu, so that, often, you need only press Space again to select the type. If you label a block of code as assembler, DEA will again use trial parsing to test the code, and, if no errors occur, resume parsing at Level 3 using that block as its starting point.

DEA now requires even less user intervention when parsing than before, and yet appears to maintain reliability. However, if you prefer a more 'hands on' disassembler, DEA also offers this - you can select the degree of freedom given to DEA in selecting code types, and even use functions from the main parsing menu to disassemble the whole code by hand (if you are a real masochist!). Having used DEA a few times, you will appreciate its high degree of automation, which allows it to work in the background while you do something different (the manual has details of how to ensure that DEA can produce the source code in the background even if the Pointer Environment is linked in, although unfortunately, it is still not possible to allow DEA to parse in the background, as DEA updates the name of the parsing Level).

Source Code

Having parsed the code, you go to the second stage, producing the source code. I understand that DEA (unlike some disassemblers) splits its function into parsing and source code production to improve the final output.

The source code can

be sent to screen, a printer or a file. You can specify whether any code which has not been disassembled should be listed (as Ascii/hex or just hex); if the output code should be compatible with the GST (or QMAC) macro-assembler; the character to prefix remarks in the source code, and many other options to alter the layout of the source code.

A new sub-menu allows you to tell DEA what remarks to include in the source code - DEA will recognise most rom vector and trap calls and include an appropriate remark (the trial parsing helps DEA to decipher these calls), including the name of the routine called, either in Qdos or SMS notation. If you opt to view these calls in 'long form', DEA includes a remark with details of the trap number and value of D0 when the call is made. DEA will even now report calls to the Window Manager if asked. However, this can be a bit error-prone and is best used only if you know that the program being disassembled accesses the Pointer Environment. Other remarks can be included in the source file to detail accesses to System Variables and SuperBasic variables; the status register and even error keys.

Kind Remarks

The new remarking features improve the output quality from DEA substantially and make it easier to read the assembly code. DEA seems to achieve a high level of accuracy with these remarks, although it seems more accurate when creating the source code a second time (the manual suggests sending the output to a NUL file prior to creating the final source code).

Also, when extracting part of a file, a jump to the next instruction in the source code is now spotted by DEA which inserts a NOP instruction (this prevents error messages in the Metacomco assembler). The quality of the source code is the best I have seen on a QL disassembler. Although DEA may take time over a whole file, it is much quicker than disassembling by hand. It is more accurate than other disassemblers I have seen (and needs less user intervention), which helps to reduce the overall time and puts this program in a league of its own.

Unselfish

DEA has problems deciphering self-modifying code (but then, so does the most hardened machine code programmer). I would have liked the ability to use Level 7 parsing to specify a block of machine code in the same way as a data block, as this would help the program decipher the most common type of self-modifying code more easily (where the program copies different sections of code onto itself).

DEA has certainly come a long way, and provides all the utilities any machine code programmer (or budding hacker) could ask for. This richness may be the one draw-back - the new user may be phased by the number of options on each menu! Although the tutorial in the manual helps, I would have preferred to be able to switch between short-form menus with only the basic options, and full menus. From experience, Ergon are willing to listen to suggestions and implement them where they can.

INFORMATION

Program: DEA Plus 3 V5.20. Needs min 384K.

Supplier: Ergon Development, Davide Santachiara, Via Emilio De Marchi,2 42100 Reggio Emilia, Italy.

Price: £28 (3.5in disk) payable to D. Santachiara.

CLUB ACCESS

AUSTRIA

DER Computer Club. Contact: Peter Postl, Stiegerg 5, 1150 Wien, Austria.

BELGIUM

Club Sinclair BruQsl. Contact: Jaques Tasset, Aarlenstraat 104, 1040 Brussels, Belgium.

QL Club. Leon Thianche, Rue Paul Wemaere 12-14, 1150 Bruxelles, Belgium.

FRANCE

QL Contact France. Contact: Jean-Louis Dianoux, 22 Avenue Lenine, 93230 Romainville, France.

GERMANY

Sinclair QL User Club eV. Contact: Franz Herrmann, Talstrasse 21, d-W5460 Ochenfels, West Germany. Magazine: Quasar.

GREECE

QL Athens Club. Contact: Stathis Grigoriadis, Tarsu 6-8, 10440 Athens, Greece.

HOLLAND

Sin_QL_Air. Marco Holmer, J P Coenstraat, 3531 EN Utrecht, Netherlands. Magazine: Quasar. Editor: Same as Secretary. (Chairman: Cor Biemans, Elzenstraat 5, 5461 CL Vehgel, Netherlands.

ITALY

Qitaly Club. Roberto Orlandi, Via Brescia 26, 25039 Traveglianto (BS), Italy. Tel. +39 30 6863311. Magazine: Qitaly Magazine. Editor: Dr Eros Forenzi, Via Valeriana 44, 23010 Berbenno (SO), Italy. Tel. +39 342 590450.

NORWAY

Norwegian AllSinclair Association (NASA). Contact: P Monstad, NASA, N-5580 Oelen, Norway. Magazine: Sinclair Magazine.

SCOTLAND

Scottish QL Users Group. Alan Pemberton, 65 Linger wood Rd, Newtongrange, Midlothian EH22 4QQ. **SPAIN**

Qliper. Editor: Salvador Merino, Ctra C_diz, Cer_micas Mary, 29640 Torreblanca del Sol, Spain. **Magazine: Qliper.**

SWEDEN

Svenska QL-Gruppen. Contact: Johan Boman, Toftaasgatan 73, 42147 Vastra Frolunda, Sweden. Magazine: QL-Bladet.

Jamten-TCL (International QL echomail conferences) BBS +46-63-133330. Michael Cronsten, Radhusgatan 61E, 83137 Ostersund, Sweden.

TURKEY

QL Qlub. Contact: Bulent Artuz, Prof. Sitesi B/1 D/5, Etiler 80600, Istanbul, Turkey.

UK

Quanta (UK): Membership Secretary, Bill Newell, 213 Manor Road, Benfleet, Essex SS7 4JD. Magazine: Quanta. Editor: Bill Fuggle, 20 Widnes Avenue, Selly Oak, Birmingham B29 6QE. Quanta.

Ashstead sub-group: Derek Stewart, 13 Beales Road, Great Bookham, Surrey .

Bristol sub-group: Roy Brereton, 94 Teignmouth Road, Clevedon, Avon.

East Anglia: Geraint Jones, 1 Bridgate Court, Thetford

Essex sub-group: Dave Walker, 22 Kempton's Mead, Potters Bar, Herts EM6 3HZ.

London sub-group: Jeremy Davis, 6 Elmcroft Crescent, Harrow, Middx. HA2 6HN.

North-east: Derek Stewart, 20 Emily Street, Gateshead.

Northern Ireland: Billy Turkington, Fairyhill, Rostrevor, Newry, Co. Down.

Mid-Southern sub-group: Geoff Fish, 44 Billing Avenue, Wokingham, Berks.

QL User Group (West Midlands): Mike Bedford-White, 16 Westfield Road, Acocks Green, Birmingham.

QL MUG (Merseyside): G Reynolds 051 932 1484, evenings. Meet fortnightly.

Solent sub-group: Graham Evans, 32 Reeves Way, Lowford, Bursledon, Southampton. 0703 403350.

South-West sub-group: Allan Hurford, 100 Topsham Rd., St Leonards, Exeter.

USA

NESQLUG and newsletter. Peter Hale, 195 Central Ave., Chelsea, MA 02150, USA

New SJPD Catalogue

Steve Johnson of SJPD has issued a new printed catalogue of **PD software**, and a separate list of **second-user items** including hardware - QL and other computers and QL software (including a small amount of mdv software, although most of Steve's stuff is on disk), books (including out-of-print ones) and magazines. He also occasionally has some new stuff as good prices, and will often take offers.

The PC and Shareware catalogue now has 94 disks of software - The catalogue makes it clear what is on each - a number of texts of classic books on disk (so you can edit your own version of Don Quixote if you like!), several disks of non-English-language software, and some PC-compatible emulators. The catalogue is available on disk, free in return for a QL-formatted disk and sufficient return postage/IRCs (4 x first class stamps in UK). Or contact Steve at **36 Eldwick St., Burnley, Lancs BB10 3DZ, England. Tel. 0282 451854.**

QL Press

Quasar 36 (March) is out with Power Saving mit dem QL, QI Barograph, Forth (pages and pages of it), Toolkit 2 pokes, C-Programmierung and other things. All in German, from the Sinclair QL User Club eV from **Peta Jager, Quasar Redaktion, Heisterbegallee 1, 30455 Hannover, Germany.**

QReview Vol 1 issue 3 has a considerable number of games reviews, and articles on QMaths 1, a simple Yes/No response function, DB Progs (a program from American author Bill Cable, available from Dilwyn Jones), Image Processor 2 from DJC, and a shortie on Cueshell from Albin Hessler. £2.00 from **Bruce Nicholls (Quo Vadis Design), 57 Shaftesbury Road, Romford, Essex RM1 2QJ.**

IQLR March-April 1994 has articles on the Editor SE (part 3), QIndex, exchanging QL Abacus with MS-DOS Lotus, Accessing Printer_Dat (from Dilwyn Jones), Going OnLine with your QL (very informative for beginners), and QBox USA BBS, among other things. Mainly American contributors, but wide-ranging and news and ads. from all over. USA: **Bob Dyl, IQLR, 15 Kilburn Court, Newport RI 02840, USA. Tel. 0101 401 849 3805 (from UK).** UK contact: **Geraint Jones, IQLR, 23 Ben Culey Driver, Thetford, Norfolk IP24 1QJ, UK.**

BILL'S OFFICE

Don't forget WN Richardson's **new address:**

6 Ravensmead
Chalfont-St-Peter
Buckinghamshire SL9 0NB
Tel. 0494 871319
Fax 0753 892235

The old phone number will continue in use for the time being, but will only be manned by the answering machine.

Instant Access - The File Compressed!

HARDWARE

CL Systems 081 459 1351 Real Time Digitizer

Computer Technik (Jurgen Falkenburg) 010 49 7231 81058 (Germany) Hard disk interface and systems, tower housings.

Dilwyn Jones Computing (DJC) 0248 354023 Process controller, power regulator, network prover.

Miracle Systems 0904 423986. Gold Card; QXL PC card; disk adapter; Centron-ics adapter/lead.

Qubbesoft PD 0376 347852 Miracle Trump Card, Expanderam, 3.5in disk drives. Sales and support.

W N Richardson (EEC) 0494 871319. QL systems, monitors, keyboards and interfaces, disk drives and printers, peripherals.

TF Services 0344 890986 Hermes IPC, Minerva rom, keyboard membrane, repairs, spares.

SERVICES

Adman Services (Dennis Briggs) 0952 255895 Spares, repairs, support.

Joe Atkinson 36 Ranelagh Rd., London W5 5RJ. Roms, mdvs, spares.

Quanta: General Secretary John Mason 0425 275894 User Group, support, library.

Quo Vadis 0708 755759 QReview.

SOFTWARE

COWO Electronic 010 41 45 211478 (Switzerland) QTop, Atari QL emulator, Thor support

Deltasoft 7 Tyrell Way, Stoke Gifford, Bristol. Flightdeck, Image D, AMD Airplan

Digital Precision 081 527 5493. Perfection, PC Conqueror, Lightning, Pro Publisher and others.

DJW Software 0256 881701 Homebanker

Dilwyn Jones Computing (DJC) 0248 354023 Discover, Textidy, QL-PC Fileserver, Fleet Tactical Command, QLib, Filemaster, DataDesign, QPAC2 and other Pointer Environment programs.

Di-Ren 081 291 3751 Fleet Tactical Command (Dist. by Dilwyn Jones)

Ergon Developments (Davide Santachiara) 010 39 522 70409 (Italy) ZX Spectrum emulator, Open World, others.

Jochen Merz Software 010 49 203501274 (Germany) QL/Atari emulators, QSpread, File Finder, Qptr Toolkit and other PE, QDesign 2, Qdos reference manual. German versions of Qpac 1&2, Qmon and text 87.

Lear Data Systems 6 Southview Green, Bentley, Ipswich, SUffolk IP9 2DR. PCB-CAD

Liberation Software 081 546 7795 QLib Basic compiler (Dist. Dilwyn Jones.)

Ocean Comp. Services 061 740 9002 Professional Poolster.

Pointer Products 0258 455117 PE programs

Progs (Van Auwera) 010 32 16 48 8952 (Belgium) LineDesign, DataDesign, others. (Dist. by Dilwyn Jones; LineDesign dist. by Software87)

Qubbesoft PD 0376 347852 QL Home Finance, PDomain software.

SJPD Software 0282 51854 PDomain software

Software 87 33 Savernake Road, London NW3 2JU. Text87 Plus4, Publishers' Pack.

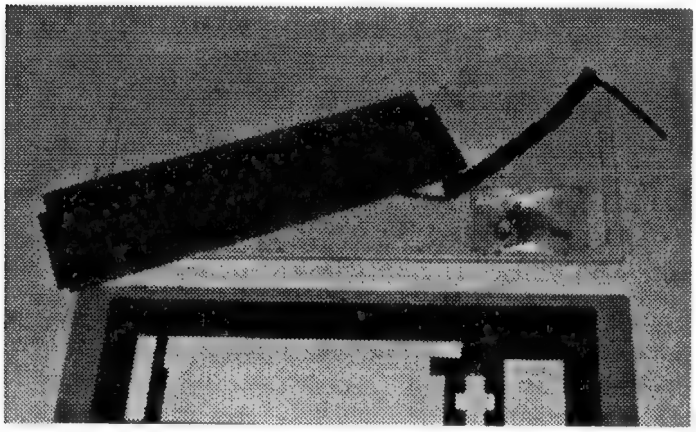
Dennis's Keyboards

Len Johnson bought a replacement keyboard and is very happy with it.

When Dennis Briggs advertised a new remote keyboard as a kit in Quanta for only £20 I jumped at the chance. As it was previously advertised at nearly £50 complete, I thought the saving would be well worth a few hours spent assembling the thing.

I was heartily sick of the difficult typing position my existing keyboard forced on me and besides, the space key was beginning to act up. I had my cheque in the post that night!

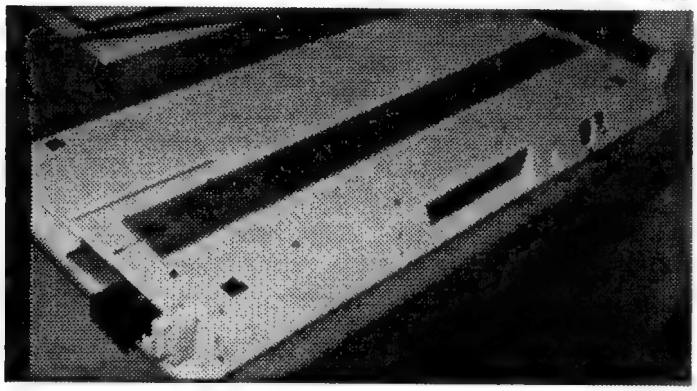
When the keyboard arrived I was surprised how simple the whole thing was. Just a few soldered connections and a few bolts and nuts and that was it. And thirty quid cheaper than the fully assembled version!



Not too many components to handle!

Gold Card Too

Dennis suggested in the instructions that the QL motherboard and Gold Card might fit into the new keyboard case easily enough and suggested fitting a small fan to keep it all cool in this case. The idea seemed quite feasible when I measured everything, and it would be one box less on my desk. I decided to have a go! In the event it proved as simple in practice as it was in theory and no electronic knowledge was needed. It soon became clear to me that the need for a fan could be worked around, and in fact my QL runs cooler now without the fan than it did in the original casing. The only snag is that in this configuration the microdrives have to be irrevocably removed. But who uses the things these days? The QL has come a long way in ten years!



The long strip of aluminium heatsink under the new case.

First set the keyboard parts out in a tidy manner and identify the half dozen or so components (**Pic A**). Next read the instructions! Carefully! Note particularly that one connector strip is reversed! A quick glance at the picture in the instructions and the QL keyboard connectors on the motherboard will show what I mean. Don't worry, if you get it wrong nothing really bad will happen. You will lose a few keys when you try the keyboard and when the fault is put right everything will work as normal.

The curly lead supplied can be used, but when the case is closed I found things a little tight With hindsight I would use a foot or so of flat disk drive type connector wire from Tandy's. This would fold more easily when the lid is screwed down.

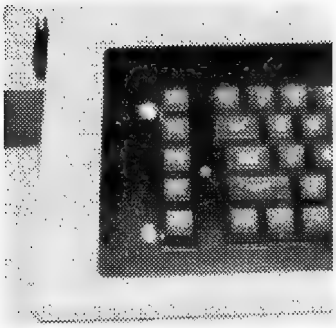
Heat Sink

You will need to buy a piece of 50x3 mm (2in by one eighth) aluminium or stainless steel strip the length of the QL to act as a heatsink (Pic B). Most aluminium fabricators or sign makers will simply give you a piece if you ask nicely.

Once the keyboard wiring has been done according to the instructions, an hour or so with a small soldering iron, the QL can be dismantled.

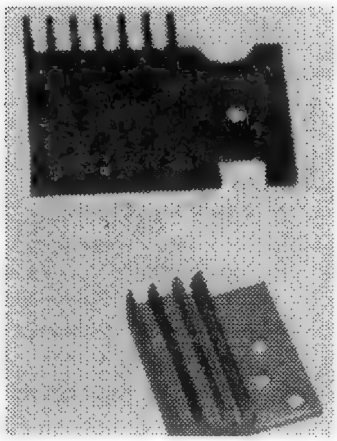
Remove all the screws from underneath the black beast and the top keyboard will lift of. Carefully ease the keyboard connector strips from the motherboard and set the keyboard to one side for now. At this point carefully note how the connectors carrying the keyboard connecting strips are fitted in the sockets on the motherboard. The six wires going to the leds (the little warning lights on the keyboard) for power and microdrives can now be eased up from the socket. The top of the socket slides upwards a fraction to release the wires from the connector. It is best to use a pair of tweezers for this as there are a couple of blue capacitors close to the connector block and you won't get your fingers close enough. Alternatively, simply cut the wires as close as possible to the block with a pair of nail clippers and put a piece of tape over the raw ends to prevent a short circuit. If you do cut them make sure nothing can touch the bare wire ends, and that they are too short to bend and touch each other when the lid goes on!

Remove two of the leds complete with a length of wire from the QL's keyboard and put them to one side. You will need one for the new keyboard as a power-on light. Use the other if you have fitted the Caps Lock indicator and



Indicator LED if the Quanta capslock is fitted.

Quanta software. I have this Caps Indicator fitted (**Pic C**) and it only took a few minutes to do. The



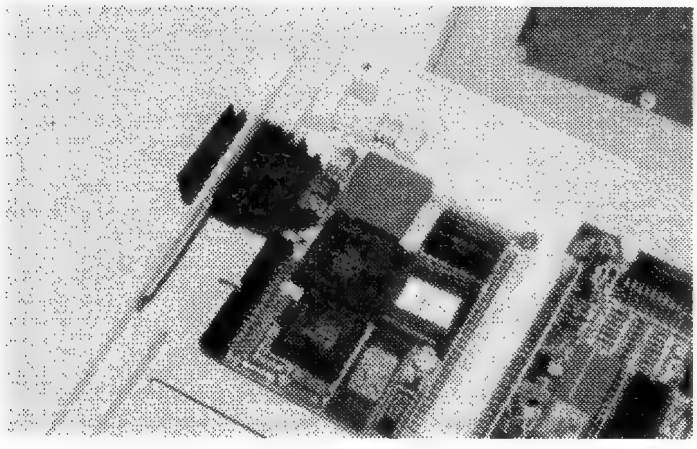
Compare the size of the-cut-down heatsink with the Gold Card heatsink .

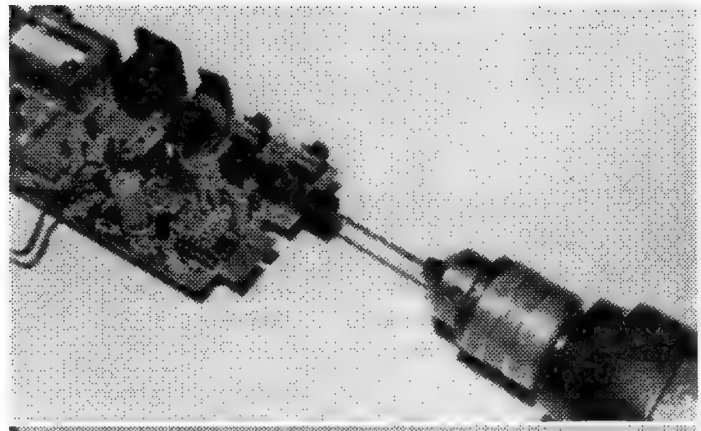
only problem is that it involves soldering a few wires directly to one of the chips and you must know what you are doing. Nevertheless, it is well worth doing if you type like me! No more screaming when I look up and find the last paragraph all in capitals. Quanta will supply the simple circuit if you decide to fit it.

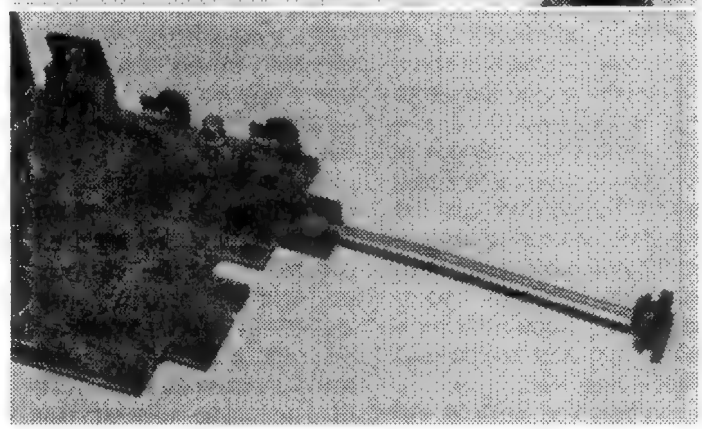
Exeunt MDVs!

Now remove the screws holding the microdrives in place and lift the motor assemblies out of the case. The two black wiring strips connecting them to the motherboard ease out of the plug-in connectors at the motherboard end and the microdrives can then be lifted clear and dumped. (I enjoyed that bit!) Note the connector on the motherboard does not raise to release the wires like the led connector; on this one the wires simply ease out under finger pressure. Next remove the bolt holding the black finned heatsink at the right hand side of the QL and push the three pronged 5-volt object the bolt was holding out of the way for the time being. Cut the heatsink in two as shown, leaving the bolt hole intact in one of the pieces. Remove the heatsink from the Gold Card and fit the larger piece of the black QL one in its place with a piece of double sided tape, but do not put the bolts in yet. (The bolt going through the heatsink will go right through the keyboard case and hold the Gold Card in position when the motherboard is finally fitted in the new keyboard case.) The reason for fitting the larger heatsink (**Pic D**) is to let it project from the side of the keyboard half an inch or so. The original Gold Card heatsink is too short for this. Maybe this is overkill but my setup really does run comparatively cool now. The Trump card is longer than the Gold Card and will probably project enough to cool itself without any modification but I have not actually tried this.

Gold Card in place beside the heatsink and disk cable slots. The GC is secured by bolts through the ends of the main connector.







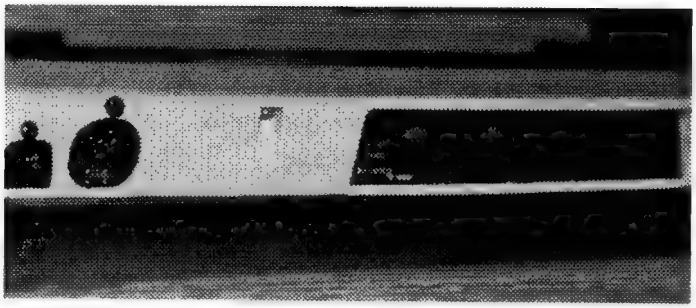
Drill a hole in the Reset button and extend with spoke wire or similar - the new end is a grommet.

Mark the positions of the holes in the case needed for the monitor, power plugs and the leds. Set the Gold Card or Trump Card up against the case on the left hand side and run a pencil round the heatsink and disk drive plugs (**Pic H**). I cut the holes through the case by drilling a series of one eighth holes and then joining them up with a piece of junior hacksaw blade. A piece of sandpaper rolled up into a tube puts a nice finish on the holes. Try to make a neat job of the hole for the power led light as this can be seen from the top of the keyboard. When the holes are cut, slide the motherboard and Gold Card into position so that the various plugs line up with the holes in the case.

Now you can mark the position of the last hole needed in the case. The original heatsink had a voltage control device bolted to it. The wires connecting this device need to be lengthened by about 4in. The transistor simply unplugs at one end, but the other end needs to be cut. Please make sure all new wiring is well insulated and nothing can short out. Lastly, the device needs a hole through the case to bolt it to the length of aluminium heat sink you bought.

Reset Extension

One more hole is needed. The original reset switch needs to be brought out through the case. You



The QL motherboard sockets - holes cut, and the sockets secured with screws from outside.

could unsolder it and fit it or a replacement in the new case but there is an easier way - drill the reset switch with a one sixteenth hole in the end to take a cycle spoke or a length of stiff wire. I used a knitting needle Supaglued into the end of the switch to lengthen it. A small grommet Supaglued on the end of the knitting needle forms a neat finish and works well (**Pics J and K**).

When the hole is cut for the heatsink fix the aluminium strip under the keyboard with double-sided carpet tape and bolt the motherboard and Gold Card into the case with bolts through the various existing holes (**Pic M**). I used plastic dress snaps as insulating washers for this job!

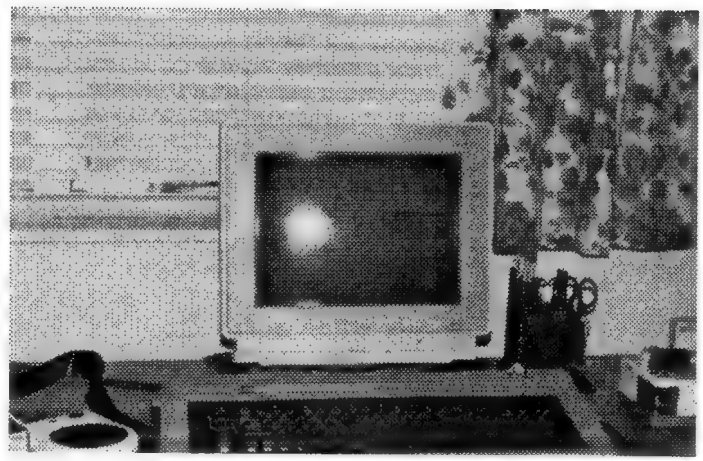
It's a good idea to strengthen the sockets on the motherboard against the thrust of the various connectors as they are inserted. I used a few long self-tapper screws through the keyboard case and through the top of the sockets on the motherboard (**Pic M**). These screws steady things up nicely. Don't omit them.

Make sure its connecting wires are taped to the edge of the case, and pop the red led you removed from the old keyboard into the hole in the top right hand corner of the new keyboard and secure with a dab of glue and that's about it! Put the wires back into the connector on the motherboard. You did note the way they were fitted originally didn't you?

Close the top of the case with a couple of screws and switch on. When you try the keys you might find some are not working. The cause will be the connector strips. You will probably need to reposition one or the other slightly to the left or right to line the fiberglass connector strips with the strips in the connector block.

And that's it!

The QL should have looked like this 10 years ago!!



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A replacement QL co-processor for the QLs awful IPC 8049

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JS COMPLETE (A FEW LEFT) QL Computer, PSU, T.V. Lead, PSION V2.35 Software (Word Processor, Spreadsheet, Database & Business Graphics). Handbook for QL Programs , & Superbasic. Free one years membership to QUANTA, the independent QL User Group with over 400 free library programs, Newsletters & HELP. 6 MONTHS WARRANTY. JS £120

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PART EXCHANGE £30 OFF ABOVE. Send in old QL (Unit only, any condition) - JS ROM £90 JM £ 70.00

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NOTE: EXTERNAL (SER2) 3 BUTTON MOUSE AND SOFTWARE WITH EXTRA FUNCTIONS. NOW HERMES COMPATIBLE

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Biorhythm Calculator

Neil Gordon simply checks out body-rhythms.

While not entirely certain of the practical effects of the theory of 'Biorhythms', I wrote the accompanying program as a simple biorhythm calculator to try it out. Perhaps a short description of biorhythms is in order for those who have missed out on these "guides to the body's natural cycle".

Biorhythms are a name given to the apparent cycles that certain aspects of our bodies follow. It has been found that most people's bodies follow certain rhythms, approximating to sine waves of various periodicity. These rhythms start the moment we are born, and continue regularly from then on.

Good days

Biorhythms are taken seriously by many people, and it is said that they are widely used, by everyone from football coaches checking on likely player performance, to airlines wanting to check on pilot-safety (in particular watching out for zero days - see below).

Aspects of our body-rhythms are divided into three types for this study:

```
100 REMark *Neil Gordon*
110 REMark *DEFAULT DATE DATA*
120 REMark *CHANGE TO OWN DATES*
130 DATA 1968,12,20,1987,1,1
140 init_screen
150 init_data
160 update
170 REPeat mloop
180  Z=0
190  input_data
200  update
210  totalise
220  set_axes
230  FOR sfor=1 TO 3
240   pos(sfor)=total MOD length(sfor)
250   INK #3,(sfor-1)*3+1
260   draw_graph pos(sfor),length(sfor)
270  END FOR sfor
280  analyse
290  AT #4,0,28:CLS #4;3
300  PRINT #4;"RUN AGAIN(R) OR QUIT(Q)"
310  REPeat cloop
320   ch$=INKEY$(-1)
330   IF ch$=="q" THEN
340    CLOSE #3:CLOSE #4
350    CLS #2:CLS #1:CLS #0:NEW
360   END IF
370   IF ch$=="r" THEN EXIT cloop
380  END REPeat cloop
390  CLS #4
400 END REPeat mloop
410 DEFine PROCedure init_screen
420  MODE 4
430  OPEN #3,scr_512x256a0x0
440  PAPER #3,0:CLS #3
450  INK #3,7:CSIZE #3,2,1
460  AT #3,0,16:PRINT #3,"BIORHYTHMS"
470  WINDOW #3,482,122,15,16
480  PAPER #3,2:CLS #3
490  INK #3,7:BORDER #3,1,4
500  OPEN #4,con_482x114a15x142
510  PAPER #4,4:INK #4,0
520  CLS #4:BORDER #4,1,7
530  SCALE #3,134,-45,-72
540 END DEFine
550 DEFine PROCedure init_data
560  DIM pos(3),prompt$(6,25),length(3),days(12),dd(6)
570  RESTORE 610
580  FOR i=1 TO 6:READ prompt$(i)
```

```
590  FOR i=1 TO 3:READ length(i)
600  FOR i=1 TO 12:READ days(i)
610  DATA "Year of birth? (ie.","Month of birth? (ie."
620  DATA "Day of birth? (ie.","Present year? (ie."
630  DATA "Present month? (ie.","Present day? (ie."
640  DATA 28,23,33,31,28,31,30,31,30,31,31,30,31,30,31
650  RESTORE 130
660  FOR i=1 TO 6:READ dd(i)
670 END DEFine
680 DEFine PROCedure totalise
690  LOCal age,nly,ted
700  IF dd(5)>dd(2) OR (dd(5)=dd(2) AND dd(6)>=dd(3)) THEN
710   age=dd(4)-dd(1)
720   ELSE age=dd(4)-dd(1)-1
730  END IF
740  nly=(dd(4) DIV 4)-(dd(1) DIV 4)
750  IF (dd(4) MOD 4)=0 AND dd(5)<3 THEN nly=nly-1
760  IF (dd(1) MOD 4)=0 AND dd(2)<3 THEN nly=nly+1
770  IF dd(2)=dd(5) AND dd(6)=dd(3) THEN
780   ted=0
790  ELSE
800   IF dd(5)=dd(2) AND dd(6)>dd(3) THEN
810    ted=dd(6)-dd(3)
820   ELSE
830    ted=(days(dd(2))-dd(3))+dd(6)
840    m=dd(2)
850    REPeat l
860     m=m+1
870     IF m>12 THEN m=1
880     IF dd(5)=m THEN EXIT l
890     ted=ted+days(m)
900    END REPeat l
910   END IF
920  END IF
930  total=(age*365)+ted+nly
940 END DEFine
950 DEFine PROCedure draw_graph(position,length)
960  x=0:ox=0
970  oy=50*SIN(2*PI/length*position)
980  FOR p=position TO position+33 STEP .5
990   y=50*SIN(2*PI/length*p)
1000   LINE #3,ox,oy TO x,y
1010   ox=x:oy=y:x=x+.9*5
1020  END FOR p
1030 END DEFine
1040 DEFine PROCedure input_data
1050  AT #4,0,6:CLS #4,3
1060  PRINT #4;"(Press ENTER for default/previous value.)"
1070  FOR i=1 TO 6
1080   AT #4,1,0:CLS #4,3
1090   PRINT #4;prompt$(i);dd(i);") ";
1100   INPUT #4;l$
1110   IF l$="" THEN l$=dd(i)
1120   IF number(l$)=0 THEN GO TO 1080
1130   IF l$<1 THEN GO TO 1080
1140   SELect ON i
1150    =1
1160     dd(1)=l$
1170    =2
1180     IF l$>12 THEN GO TO 1080
1190     dd(2)=l$
1200    =3
1210     IF l$>days(dd(2)) THEN GO TO 1080
1220     dd(3)=l$
1230    =4
1240     IF l$<dd(1) THEN GO TO 1080
1250     dd(4)=l$
1260    =5
1270     IF l$>12 OR (dd(4)=dd(1) AND l$<dd(2)) THEN GO TO 1080
1280     dd(5)=l$
1290    =6
1300     IF dd(4) MOD 4=0 AND dd(5)=2 AND l$=29 THEN GO TO 1330
1310     IF l$>days(dd(5)) THEN GO TO 1080
1320     IF dd(4)=dd(1) AND dd(5)=dd(2) AND l$<dd(3) THEN GO TO 1080
1330     dd(6)=l$
1340   END SELect
1350  END FOR i
1360  CLS #4
1370 END DEFine
1380 DEFine FuNction number(x$)
1390  FOR scan=1 TO LEN(x$)
1400   IF  x$(scan) INSTR "0123456789"=0 THEN RETurn 0
1410  END FOR scan
1420  RETurn 1
1430 END DEFine
1440 DEFine PROCedure set_axes
1450  CLS #3
1460  CSIZE #3,0,0
1470  LINE #3,0,-50 TO 0,50
1480  LINE #3,0,0 TO 298,0
1490  LINE #3,298,-50 TO 298,50
1500  AT #3,2,2:PRINT #3,"+VE"
1510  AT #3,8,2:PRINT #3,"-VE"
1520  AT #3,5,2:PRINT #3;"ZERO"\'  LINE'
1530  AT #3,11,6:PRINT #3;"(TODAY)"
1540  FOR i=0 TO 11
1550   AT #3,10,(i*5.4+9)
1560   PRINT #3,i*3
1570  END FOR i
1580  AT #3,11,20
1590  PRINT #3;"Number of days from present day"
1600  INK #3,0
1610  LINE #3,309,43 TO 337,43
1620  AT #3,2,70:PRINT #3,"EMOTIONAL"
1630  INK #3,4
1640  LINE #3,309,10 TO 337,10
1650  AT #3,5,70:PRINT #3;"PHYSICAL"
1660  INK #3,7
1670  LINE #3,309,-25 TO 337,-25
1680  AT #3,8,70:PRINT #3;" MENTAL"
1690 END DEFine
1700 DEFine PROCedure analyse
1710  AT #4,3,0
1720  PRINT #4,"CYCLE      NO. OF DAYS STATE OF COMMENT (FOR TODAY)
1730  PRINT #4,"          THRO' CYCLE  CYCLE"
1740  PRINT #4;"EMOTIONAL"\"PHYSICAL"\"MENTAL"
1750  FOR i=1 TO 3
1760   AT #4;i+4,14-LEN(pos(i))
1770   PRINT #4;pos(i);"/";length(i)
1780   AT #4,i+4,22
```

```
1790   state
1800  END FOR 1
1810  IF Z>0 THEN
1820   AT #4,1,2
1830   PRINT #4;"***WARNING*** ";

1840   SELect ON Z
1850    =1:PRINT #4;"ZERO DAY .BE EXTRA CAREFUL ACCIDENTS ARE LIKELY";
1860    =2:PRINT #4;"DOUBLE ZERO DAY, BE VERY CAREFUL AND STAY ALERT";
1870    =3:PRINT #4;"TRIPLE ZERO DAY,UNUSUAL SO BE EXTREMELY CAREFUL";
1880   END SELect
1890   PRINT #4;" ***WARNING***"
1900  END IF
1910  AT #4,8,10
1920  PRINT #4;"[THE GRAPH CAN BE USED TO PREDICT ";
1930  PRINT #4;"YOUR CONDITION OVER A PERIOD"
1940  AT #4,9,10
1950  PRINT #4;"OF TIME.THE SHAPE OF THE GRAPH CORRESPONDS ";
1960  PRINT #4;"TO YOUR BIORHYTHMS"
1970  AT #4,10,10
1980  PRINT #4;"THUS YOU WILL FEEL YOUR BEST ";
1990  PRINT #4;"AT A PEAK(AND VICE VERSA)etc.]";
2000  INK #4,7
2010  LINE #4,0,55.5 TO 320,55.5
2020  LINE #4,0,73 TO 320,73
2030  LINE #4,0,28 TO 320,28
2040  LINE #4,38,28 TO 38,73
2050  LINE #4,87,28 TO 87,73
2060  LINE #4,121,28 TO 121,73
2070  INK #4,0

2080 END DEFine
2090 DEFine PROCedure state
2100  IF pos(1)=0 THEN zero:RETurn
2110  IF pos(1)<=(length(1)+2)/2 AND pos(1)>=length(1)/2 THEN
2120   zero:RETurn
2130  END IF
2140  IF pos(1)>length(1)/2 THEN down
2150  IF pos(1)<length(1)/2 THEN up
2160 END DEFine
2170 DEFine PROCedure update
2180  AT #4,2,10:CLS #4,3:PRINT #4;"DATE OF BIRTH =  ";
2190  FOR i=3 TO 2 STEP -1
2200   PRINT #4;FILL$(" ",2-LEN(dd(i)));dd(i);":";
2210  END FOR i
2220  PRINT #4;FILL$(" ",4-LEN(dd(1)));dd(1)
2230  AT #4,2,40
2240  PRINT #4;"PRESENT DATE =  ";
2250  FOR i=6 TO 5 STEP -1

2260   PRINT #4;FILL$(" ",2-LEN(dd(i)));dd(i);":";
2270  END FOR i
2280  PRINT #4;FILL$(" ",4-LEN(dd(4)));dd(4)
2290  INK #4,7
2300  LINE #4,38,74.5 TO 150,74.5 TO 150,82 TO 38,82 TO 38,74.5
2310  LINE #4,158,74.5 TO 266,74.5 TO 266,82 TO 158,82 TO 158,74.5
2320  INK #4,0
2330 END DEFine
2340 DEFine PROCedure zero
2350  PRINT#4;"ZERO DAY WATCH OUT TODAY,YOUR BODY IS OFF BALANCE."
2360  Z=Z+1
2370 END DEFine
2380 DEFine PROCedure down
2390  PRINT #4;"  DOWN   ";
2400  IF length(1)=33 THEN
2410   PRINT #4;"You may have trouble learning and concentrating."
```

```
2420  END IF
2430  IF length(1)=23 THEN
2440   PRINT #4;"You may be tired and have slow reactions today."
2450  END IF
2460  IF length(1)=28 THEN
2470   PRINT #4;"You may feel depressed or more 'serious' today."
2480  END IF
2490 END DEFine
2500 DEFine PROCedure up
2510  PRINT #4;"   UP    ";
2520  IF length(1)=33 THEN
2530   PRINT #4;"You should feel bright and alert today."
2540  END IF
2550  IF length(1)=23 THEN
2560   PRINT #4;"You should feel strong and energetic today."
2570  END IF
2580  IF length(1)=28 THEN
2590   PRINT #4;"You should feel cheerful and peppy today."
2600  END IF
2610 END DEFine
```

Biorhythm Calculator

the physical, the intellectual, and the emotional. Each of these types has a different period, the physical being of 23 days, the intellectual of 33, and the emotional of 28 days.

When the current part of a cycle is positive, then we are in a better state, so a positive emotional wave would correspond with a feeling of well-being. Conversely, if your emotional wave is in a negative phase, you may feel down. The physical and intellectual waves follow a similar pattern.

Zero days!

The days when a wave crosses from positive to negative are termed 'zero' days, and spell trouble!

The accompanying program calculates your age (in days) and then finds the state of your biorhythms, drawing a graph of the following month's cycles. It also gives a short resume of the general meaning of your present cycle.

Linear Regression

AF Wilson presents a statistical solution with Abacus.

Linear regression is a powerful statistical tool for determining **linear relationships between parameters or variables.** In simple terms, linear regression determines the equation of a straight line, Y=mX+c, for variables X and Y using mathematical formula (see **Equation Box**). This avoids having to plot the data on graph paper, drawing the `best fit' line through the plotted data and finally determining both the slope (m) and the y-axis intercept (c) from the graph (see **Graph one**).

A Straight Line

As an undergraduate, determining the equation of a straight line, Y=mX+C (graph one) using linear regression was very important in the analysis and interpretation of both my chemistry and physics experimental data. Linear regression analysis was preferred to the X-Y plot method because it saved a lot of time and effort. Once the equation was derived, I could substitute any X value into the equation to calculate the corresponding Y value without having to revert to the less accurate X-Y plot. The same holds true when calculating the X value from known Y values, however, the equation has to be rearranged, for example as X=(Y-c)/m.

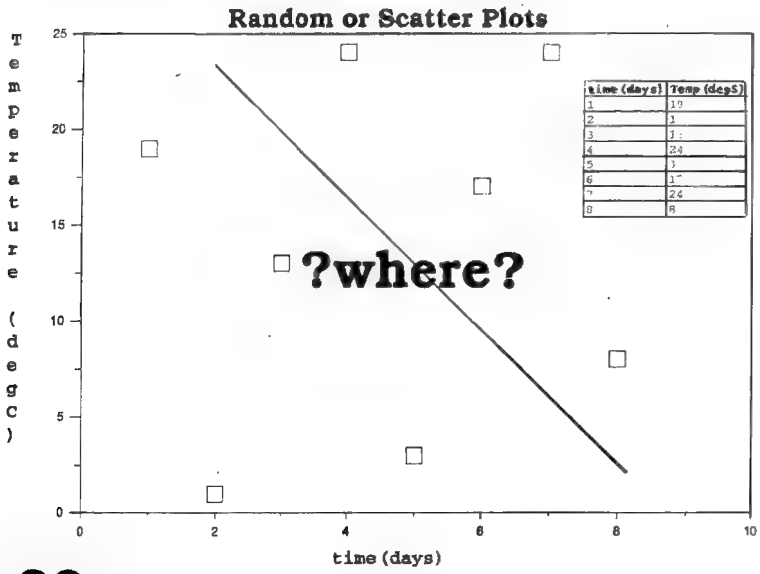
In the early years of home computing, games dominated the software output of most programmers. However, my need for a linear regression program was immediate. After comparing Fortran regression listings with the regression equations I was able to write a suitable linear regression program using ZX Spectrum Basic. The resultant linear regression program was very simple, but a bit slow as a result of the ZX Basic interpreter. As my statistical and reporting demands increased, the size of the program increased too, at the expense of speed.

My upgrade to the superior and faster Memotech

Graph Four - The simplest graph - out of sequence for space reasons.

Graph 4

Random or Scatter Plots



Linear Regression Worksheet Template for PSION Abacus

Listing (revised 1992):

```
[A1]  "Linear Regression Worksheet by A.F.Wilson 1989"
[A2]  rept("=",45)
[A4]  "Follow key presses after colons."
[A6]  "Data Input Section          :"
[A8]  "Display Regression Results :"
[A10] "Print Regression Results    :"
[A12] "Save Worksheet              :"
[A14] "Load Worksheet              :"
[A16] "Export Data to Easel        :"
[A18] "Reset Worksheet data        :"

[D6]  "F5 A25
[D8]  "F5 H2
[D10] "F3 P D H1:N20
[D12] "F3 S filename
[D14] "F3 L filename
[D16] "F3 F E E range <ENT> C filename
[D18] "F3 R A34:A131  and  F3 R B32:C131

[A25] "Linear Regression Data Input Section
[A26] rept("-",36)
[A28] rept("=",77)
[A29] "NUMBER
[A30] "of points
[A31] rept("=",77)
[A32] 1
[A33] A32+1

[B29] "X-DATA"
[C29] "Y-DATA"
[D29] "SUM (MEAN"
[D30] "- X-DATA)"
[E29] "SUM (MEAN"
[E30] "- Y-DATA)"
[F29] "top line"
[F30] "of Corr C."
[G29] "SUM of"
[G30] "ERRORS"

[A132] rept("-",77)
[A134] rept("=",77)
[A133] count(A32:A131)
[B133] sum(B32:B131)
[C133] sum(C32:C131)
[D133] sum(D32:D131)
```

```
|E133| sum(E32:E131)
|F133| sum(F32:F131)
|G133| sum(G32:G131)

F3 E A33 A34:A43

|B32| 278
|B33| 283
|B34| 288
|B35| 293
|B36| 298
|B37| 303
|B38| 308
|B39| 313
|B40| 318
|B41| 323
|B42| 328
|B43| 333

|C32| 1.304
|C33| 1.290
|C34| 1.285
|C35| 1.277
|C36| 1.265
|C37| 1.255
|C38| 1.242
|C39| 1.236
|C40| 1.217
|C41| 1.207
|C42| 1.199
|C43| 1.183
```

MTX computer in 1984 resulted in a rewrite of the linear regression program. The rewrite included a polynomial equation solver, screen X-Y plot and machine code graphics print dump utility. The MTX regression program was a trusty servant until my MTX gave up in 1989. My replacement was the Sinclair QL: however, the thought of converting the MTX Basic/Z80 machine code regression program to SuperBasic/68K machine code was daunting.

Not Easel

A friend suggested using **Psion Abacus and Easel** for linear regression and X-Y plot output respectively. The linear regression worksheet was quickly designed (see the **Listings**). Unfortunately, Easel lacked the ability to plot X-Y graphs. The X-Y plot was not essential as a result of the detailed linear regression summary produced (see the **Report Box**). However, I did include an export option to Easel in case someone provided a Easel X-Y plot extension, like the TurboQuill+ scroll enhancements for Quill.

Even if Easel provided a X-Y plot option like the mainstream PC compatible spreadsheets (see **Graph two**), some drawing skills are still needed. First you have to reprint the graph with symbols only, no connecting lines between the data points. Then draw the `best fit straight line' through the plotted data (see **Graph three**). The slope (m) and intercept (c) can then be determined (see **Graph one**).

As I stated in my opening remarks, linear regression is an important analytical tool in business and science for forecasting, trending and determining relationships between variables (such as the effect of increased advertising (x) on sales (y)). Linear regression is not limited to the simple X-Y case described above and can be extended to include multiple linear regression analysis. For example, sun tan oil sales (y) will be dependent on a number of factors - advertising (x1), the effect of the weather (x2) and competitor product promotions (x3).

The quality of the experimental, test, questionaire or sales data is important for accurate forecasting or prediction of information, such as, will it rain at the weekend? Or will the stock market crash? Or whatever. Also one must apply common sense when viewing or interpreting plotted or analysed data. For instance, a straight line can be drawn through data plotted in **Graph four**; however, as any intelligent person can see, there is no relationship or correlation between this data. This is sometimes called a RANDOM or scatter plot.

The linear regression worksheet also determines the amount of randomness or scatter as the correlation coefficent (r) without having to plot the data. For

Equation Box:

$$\text{Slope (m)} = \frac{n\Sigma xy-\Sigma x\Sigma y}{n\Sigma x^2-(\Sigma x)^2}$$

$$\text{Intercept (c)} = \frac{\Sigma x^2\Sigma y-\Sigma x\Sigma xy}{n\Sigma x^2-(\Sigma x)^2}$$

$$\text{Corr. Coef. (r)} = \frac{n\Sigma xy-\Sigma x\Sigma y}{[(n\Sigma x^2-(\Sigma x)^2)*(n\Sigma y^2-(\Sigma y)^2)]^{0.5}}$$

where n = number of points and Σ = summation term

```
[D32] IF(B32>0,(B32-($B133/$A133))*(B32-($B133/$A133)),0)

F3 E D32 D33:D131

[E32] IF(C32>0,(C32-($C133/$A133))*(C32-($C133/$A133)),0)

F3 E E32 E33:E131

[F32] IF(B32>0 OR C32>0,(B32-($B133/$A133))*(C32-($C133
/$A133)),0)

F3 E F32 F33:F131

[G32] IF(B32>0 OR C32>0,((C32-($C133/$A133))-(($F133/($D133
+1E-18))*(B32-($B133/$A133))))*((C32-($C133/$A133))-
(($F133/($D133+1E-18))*(B32-($B133/$A133)))),0)

F3 E G32 G33:G131

F3 X

[H2]  "Linear Regression Results of"
[H3]  "rept("-",26)
[H5]  "Number of Observations (points)        is"
[H7]  "Number of Degrees of Freedom           is"
[H9]  "The Slope of the Line (m)              is"
[H11] "The Correlation Coefficient (r)        is"
[H13] "The Y-axis Intercept (c)               is"
[H15] "Standard Deviation of Points from Line is"
[H17] "Standard Error of Slope                is"
[H19] "Standard Error of Intercept            is"
[H21] "Return to Main Menu : F5 <ENT>"

[L5]  A133
[L7]  IF(A133<30,A133-2,A133-1)
[L9]  F133/(D133+1E-18)
[L11] IF(D133>0,F133/SQR((D133*E133)+1E-18),1)
[L13] (D133*C133-B133*F133)/(A133*D133)
[L15] IF(A133<30,SQR(G133/(A133-2)),SQR(G133/A133))
[L17] L15/SQR(D133+1E-18)
[L19] L15*SQR((1/A133)+(B133^2)/(A133^2)/(D133+1E-18))
```

Report Box:

Number of Observations (points)	is	12
Number of Degrees of Freedom	is	10
The Slope of the Line (m)	is	-0.002165
The Correlation Coefficient (r)	is	-0.9965184
The Y-Axis Intercept (c)	is	1.90808485
Standard Deviation of Points from Line	is	0.00342485
Standard Error of Slope	is	0.00005728
Standard Error of Intercept	is	0.01752697

instance, a correlation coefficient of 0 is RANDOM, whereas correlation coefficient of +1 or -1 means that all the plotted data lies on a straight line. The sign of a correlation coefficient just indicates the direction of the slope, see Graphs 1 and 3 respectively. Only in a perfect world do we see correlation coefficients of 1. Typically, correlation coefficient are 0.85 to 0.95.

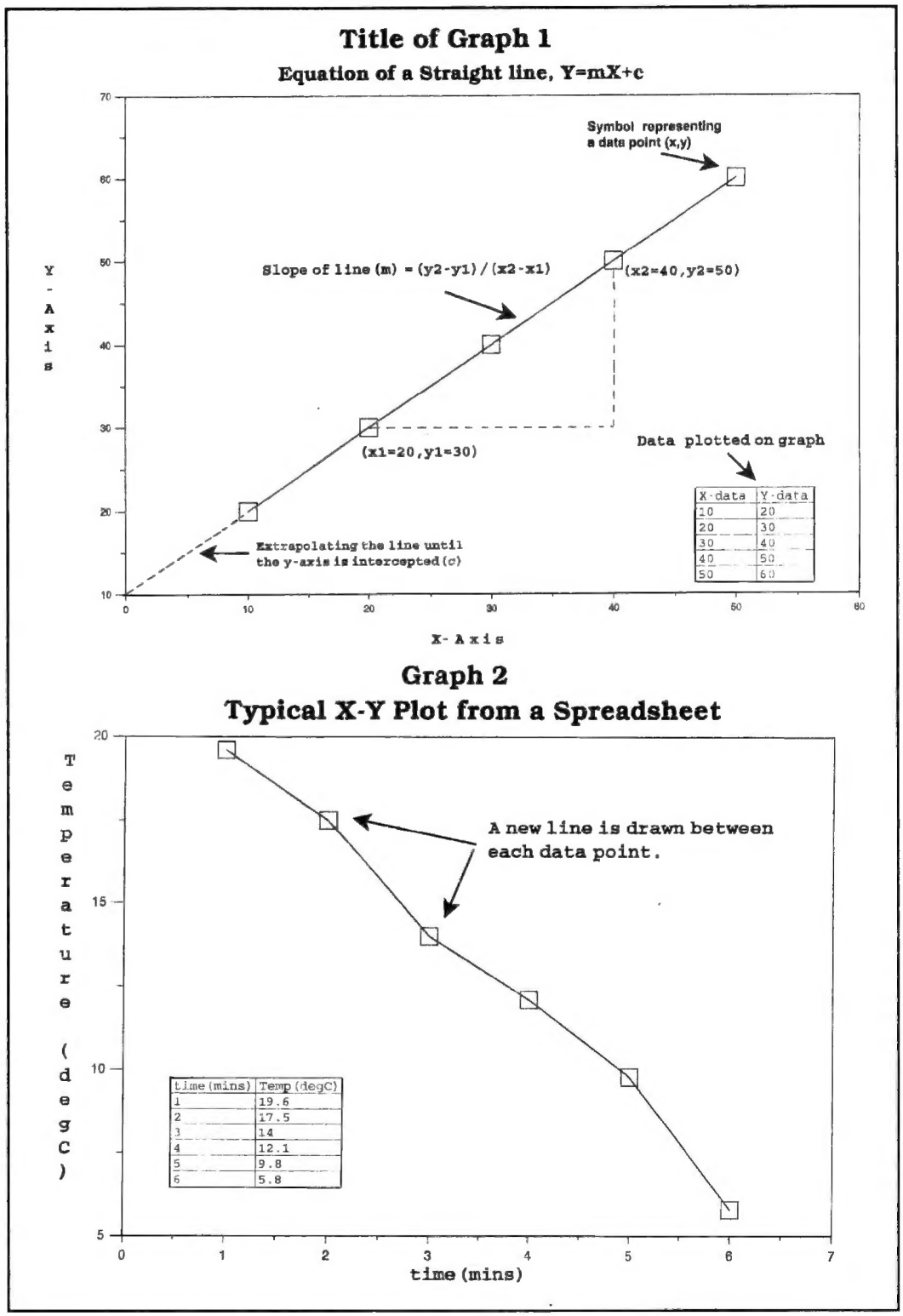
Throughout the text I have used the phrase `best fit to a straight line`. If you square the percent correlation coefficient term, the resultant value is a measure of the `best fit to a straight line' (r2). For example, a correlation coefficient of 0.95 gives a best fit or r2 of 90% ((0.95*0.95)*100) which means that 90% of the data points lie on the line.

The Abacus linear regression worksheet report includes a number of other important statistical analyses (see **Report Box**). The standard deviation and errors in both the slope and intercept are a good measure of how well the data approximates to Y=mX+c. The bigger the standard deviation and errors then the less confident we are in using the Y=mX+c model to predict future values of X and Y.

Draw tram lines either side of and in parallel to the `best fit straight line' at 1%, 5% and 10% intervals. The tram line gap is a visual representation of our prediction confidence. If all the data falls within the 1% confidence tram lines then we are confident in our Y=mX+c prediction model.

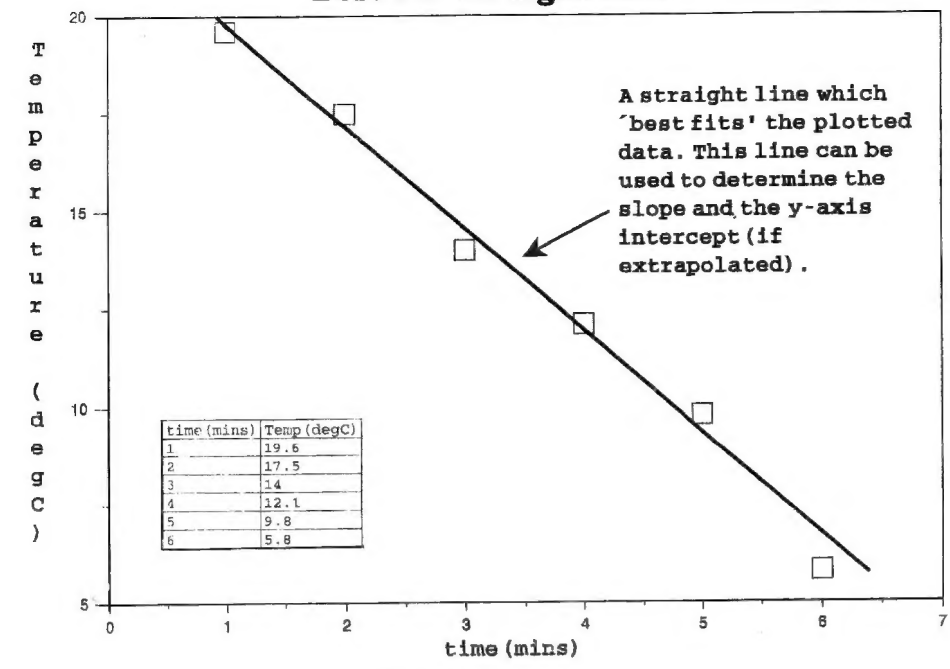
Linear regression is now standard in all mainstream spreadsheets, all statistical applications, and also available on some scientific calculators. I hope the Abacus listing rectifies this omission. A stats program for the QL is long overdue. Maybe Robin Stevenson will incorporate the linear regression routines into his archive stats listings (see QL World II.5, **`Archive Answers - Standard Deviations'**).

To go about using the worksheet, from step one:



Graph 3

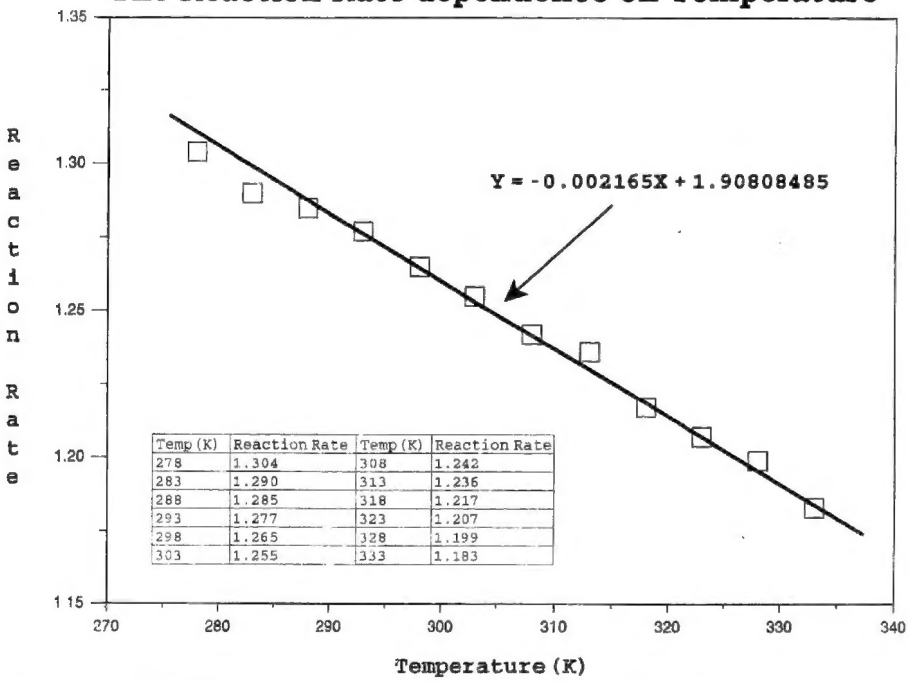
'Best Fit' Straight Line



time (mins)	Temp (degC)
1	19.6
2	17.5
3	14
4	12.1
5	9.8
6	5.8

Graph 5

The Reaction Rate dependence on Temperature



Temp (K)	Reaction Rate	Temp (K)	Reaction Rate
278	1.304	308	1.242
283	1.290	313	1.236
288	1.285	318	1.217
293	1.277	323	1.207
298	1.265	328	1.199
303	1.255	333	1.183

Press the Reset button on your QL; insert Psion Abacus into mdv1_/flp1_ and put a blank formatted cartridge in mdv2_/flp2_. Press F1 or F2 depending on your VDU. Abacus will autorun. When loaded, select 64 or 80 columns and press F2 to get rid of the command table. This gives you the maximum display area.

It is necessary when typing the listing to include some x,y data points, (see Listing) to avoid 'ERROR: division by zero', when inputting some formula. The spreadsheet was designed to handle up to 100 x,y data points. To speed up data entry, switch off autocalculate and change calculation order to COL :

F3 D A <ENT>(on/OFF toggle for autocalc)
C <ENT>(COL/row toggle for calculation order)

Now type the listing and save to microdrive/floppy as either mdv2_LINREG_aba or flp2_LINREG_aba. The moment of truth has arrived: press the keys F3-X to execute the example regression. The report summary on the screen should match the one in the **Report Box**. Otherwise, you have made a mistake.The above x,y data gives the following equations:

y = -0.0022x + 1.91
x = (y-1.91)/-0.0022
or
y = -0.002165x + 1.908
x = (y-1.908)/-0.002165

depending upon the the accuracy of the analysis. Generally, the accuracy can be no greater than the input. In this case quoting more than 3 decimal places is pointless (see the table with **Graph five**).

It is very important to take care when rounding up as this can greatly affect your equation and the accuracy of the subsequent analysis. The graphical method will have the same accuracy as the rounding. Generally, only report the slope and intercept to the same number of decimal places as the inputted data and use scientific notation where possible,eg 0.002165 becomes 2.165e-3.

As another example, take any two points from the above data and substitute them into the above equations, the results of which are given below:

x=303, y = -0.0022*303 + 1.91 = 1.243
x=303, y = -0.002165*303 + 1.908 = 1.252
x=303, y measured = 1.255
y=1.207, x = (1.207-1.91)/-0.0022 = 319.5
y=1.207, x = (1.207-1.908)/-0.002165 = 323.8
y=1.207, x measured = 323.0

After LINREG_aba has been fully debugged, rubout the data points and save the linear regression spreadsheet template to microdrive/floppy disk:

F5 A1<ENT>
F3 R
A34:A131<ENT>(rubout data points)
F3 R B32:C131<ENT>
F3 X
F3 S flp2_LINREG_aba <ENT>

Note that when LINREG_aba is loaded into Abacus it should default to the menu page.

DJC

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